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Sustainability or Status Quo:
An Assessment of Elite Influence in the Political Ecology of Belizean Mangroves

by

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Declaration

I hereby declare that this thesis has been composed by myself and the work within it is my own, except where otherwise referenced.

Simon Andrew Zisman

Dedication

Two weeks before this Ph.D. was submitted, the sad news came through from Belize that Dr. Marla Holder had died trying to save a child from drowning. She was Belize's top environmental scientist, a fun-loving, charming and kind person. This Ph.D. is dedicated to her memory.

Ulysses,

Alfred, Lord Tennyson

'Though much is taken, much abides: and though
We are not now that strength which in old days
Moved earth and heaven; that which we are, we are;
One equal temper of heroic hearts,
Made weak by time and fate, but strong in will
To strive, to seek, to find, and not to yield'.

Abstract

This research, by investigating the actions of mangrove stakeholders in Belize, reveals why the ruling elite who govern resource use rarely benefit from more sustainable exploitation, and how they resist attempts to achieve it.

The context for this examination centres around a British bilateral aid project aimed at implementing sustainable forest use and rational land allocation in Belize. This project followed in the wake of the UK's official adoption of the 'good governance' orthodoxy in its aid policy in 1991. Through observation, discussion and interaction with stakeholders, analysis of government land development records and scrutiny of particular development projects, the significance of elite stakeholders has been assessed over 1988-1995. This encompasses periods of government by both Belize's main political parties.

The framework chosen for this evaluation is political ecology, a multi-scale and pluralistic approach that allows integrated assessment of elite activities and environmental, economic and socio-political influences. Inventory, mapping and analysis of patterns of land development in the coastal zone show that although Belize's mangroves remain largely intact, their degradation escalated between the late 1980s and early 1990s. Settlement expansion, aquaculture and tourism development were the main causes. Stakeholder analysis reveals that the ruling elite were heavily implicated in the first and last of these development types. By simultaneously filling political posts and maintaining their professional occupations as developers or lawyers, certain individuals were able to influence resource use in both private and public domains. As well as directly furthering their individual well-being, in all cases, they used their positions to secure party-political support from elite groups and constituents, using various forms of patronage. Given the shortage of capital, state-owned natural assets are used as the currency of these patronage interactions, forcing the ruling elite to vigorously defend their control over decision-making processes effecting resource use. This socio-political framework severely inhibits the scope for policy intervention to promote sustainable development.

Even when, in response to demands of other influential stakeholders, certain political actions appear in support of sustainable mangrove use, they cannot be sustained. They

reduce the ruling elite's opportunities for personal accumulation, and entail excessive political opportunity-cost by damaging intra-elite and non-elite support. Therefore, elite groups conspire to circumvent or suppress sustainable mangrove management. Unchecked, this ultimately leads to a failure of environmentally sound management policies.

In the light of these findings, the research concludes that scrutiny of elite stakeholder activity is an essential prerequisite to the promotion of sustainable development, and that political ecology and stakeholder analysis combined provide a suitable framework for doing so. To work effectively, environmental strategies either need to serve conservation and elite goals simultaneously, or circumvent elites partially or completely by using interventions beyond their influence.

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There is a very special part played in the completion of this thesis by Kim Smith. I don't know if she'll ever read this, or know my debt to her. I cherish the memories of all our great times together.

Finally, there is the last and biggest thank you to my parents, for their support, faith and encouragement. This is for you.

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Abbreviations

BAS	Belize Audubon Society
BCES	Belize Centre for Environmental Studies
BTIA	Belize Tourist Industry Association
CBI	Caribbean Basin Initiative
CDB	Caribbean Development Bank
CIDA	Canadian International Development Agency
CFO	Chief Forest Officer
CZM	Coastal Zone Management
CZMP	Coastal Zone Management Project, UNDP
CZMU	Coastal Zone Management Unit
EU	European Union
FAO	Food and Agriculture Organisation
FD	Forest Department
FPMP	Forest Planning and Management Project
GEF	Global Environmental Facility
GIS	Geographic Information System
GOB	Government of Belize
IDB	Inter-American Development Bank
IMF	International Monetary Fund
ITCF	International Tropical Conservation Foundation, Switzerland
IUCN	World Conservation Union
LSD	Land and Surveys Department
NARMAP	Natural Resources Management Project, USAID
NGO	Non-governmental Organisation
NYZS	New York Zoological Society
ODA	Overseas Development Administration (now Department for International Development)
OFI	Oxford Forestry Institute
ppt	Parts per thousand
PfB	Programme for Belize
PUP	People's United Party
SPEAR	Society for the Promotion of Education and Research
SA	Stakeholder Analysis
SDA	Special Development Area
TNC	The Nature Conservancy, USA
TFAP	Tropical Forestry Action Plan
UDP	United Democratic Party
UCB	University College Belize
UNCED	United Nations Commission on Environment and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Education and Science Council
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VSO	Voluntary Service Overseas
WWF	Worldwide Fund for Nature
WB	World Bank
WWF-US	World Wildlife Fund-USA
WRI	World Resources Institute

Introduction To The Research Topic 1

1.1 Research Background

The impetus for this study came from spending 12 months as a consultant on a bilateral aid project in Belize known as the Forest Planning and Management Project (FPMP). Completed over the period 1992-1993, its objectives were to help the Forest Department instigate mangrove management and promote sustainable mangrove use. This was in the wider context of the FPMP, which was set up to achieve similar aims for the rest of the forest sector. The project was funded by the UK's Overseas Development Administration (ODA), and was instigated as a major contribution to the Tropical Forestry Action Plan for Belize [1].

Over the duration of the consultancy, it became apparent that its objectives were being obstructed, despite the support by senior forestry staff and formal co-operation at ministerial level. The activities prescribed to promote sustainable mangrove use were repeatedly and effectively blocked by powerful vested interests, at several levels of both the public and private sector. This experience engendered the view that the role of the most powerful figures, or *elite stakeholders*, required explicit recognition in resource management, in order to understand observed patterns of natural resource use and to formulate effective measures for sustainable environmental exploitation.

The absence of this elite focus is in stark contrast to research on earlier coastal natural resource use in Belize. To understand the pre-historic Mayan coastal exploitation, archaeologists routinely examine the role of ruling elites (e.g. Andrews 1983). It is a significant omission therefore, that the FPMP committed over £2 million of UK aid but contained no elements designed to investigate the political dimensions of the environmental management activities it sought to implement. It is even more remarkable when acknowledged risks associated with achieving these goals included 'lack of political acceptance' and 'political interference' by the ruling authorities (NRI 1990). This begs the question, if political involvement is potentially so important, why is it not investigated?

[1] Following the Labour Party's victory in the May 1997 election, the ODA was re-named the Department for International Development. The name ODA is used in this thesis however, because it was under this aegis that the bulk of the work was completed.

The acknowledgement of 'political' obstacles to sustainable environmental use is often made, and in itself is not new. Environmental advisors continually complain about the political constraints to improved natural resource use. However, from a review of the literature on tropical environmental management, it is evident that in academic circles, the elite stakeholder hypothesis is not at all prominent and, where it is raised, it lacks a rigorous analytical framework and methodology. This is symptomatic of the fact that despite consensus on the continuance of environmental degradation in the Third World, there is neither widespread agreement on its causes nor persuasive theory connecting the social, economic and ecological processes involved (Little and Horowitz 1987:1).

Instead, paradigms used to explain environmental issues, including those of developing countries, follow three lines of argument. These can be separated into (i) technology assessment, (ii) general economic metaphors, and (iii) general biological metaphors (Hecht 1985).

The study of the inappropriate use of technology, in comparison to the other two approaches, lacks a theoretical foundation, and treats environmental issues as discrete technical problems arising from poor project or policy design. When ill-suited to local environmental conditions, these cause undesirable ecological side effects. Evidence to support this contention is available, with downstream declines in fisheries being just one of many examples related to dam construction (Goldsmith and Hildyard 1984, 1986). However, it is narrow on its focus and fails to examine the political, institutional or economic factors causing the emergence of inappropriate approaches. It also fails to address problems arising where there is no form of intervention to blame.

The second explanation of Third World environmental issues is based on economic analysis, and is divisible itself into three causal domains (Hecht 1985), namely 'Tragedy of the Commons' (e.g. Hardin 1968, Clarke 1974), 'Issues of Externalities' (e.g. Turner 1991) and 'Dependency Perspectives' (e.g. Redclift 1984, 1987). Their unifying concept is that it is economic logic that lies behind environmental degradation, and therefore economic analysis will uncover both its causes, and the policy and project interventions necessary to halt degradation. Where these approaches fall short however, is their inability to account for the observed patterns of exploitation, particularly in the *social distribution* of environmental costs and benefits (Hecht 1985). Hecht notes that, in relation to common property resources,

access is often moderated by class; for externalities, that their impact is often ignored because they are generated by elites and fall upon the less powerful; and in relation to dependency, environmental impacts arising from commodity production for export develop because of poor crop management (e.g. inappropriate pesticide use).

The third and most prevalent thesis about environmental degradation in the Third World is the Malthusian view (e.g. Sanchez *et al.* 1982). Inadvertently or otherwise, this view apportions responsibility for much environmental degradation on the poor. In socio-political terms, this puts the emphasis squarely on the 'swarming hoards of the powerless', rather than small groups of the powerful. Numerous authors have sought to challenge such a view (e.g. Watts 1983). Rather than trying to link population density, carrying capacity and environmental degradation, other forces need to be sought. As Ellen (1982) points out, crucial correlations are rarely those gross observable relationships between totalities, but the subtle, hidden connections between peculiarities.

Whilst all the above perspectives have contributed particular insights, as Hecht (1985) and others note, none have produced comprehensive explanations for the patterns of exploitation observed. Therefore, in striving to develop a more penetrating model of environmental degradation, a more appropriate approach is required.

In response, Bryant (1992) and others have called for environmental analysis to take a more pluralistic approach, building on the valuable insights that have been gained from the above. Batterbury *et al.* (1997) describe the need for a 'hybrid' approach to encompass the social, economic, political and environmental circumstances that influence environment/people relations, and responds to their variability over time. Added to this, Scoones (1997:161) calls for an approach to environmental change that emphasises 'non-linear dynamics, spatial heterogeneity, and the role of contingent events' in understanding the nature of resources and their management. To some extent, as Batterbury *et al.* (1997) point out, cultural ecology has a long tradition of analysis that meets these criteria and it has produced illuminating insights into people/environment relations in a range of contexts. Nonetheless, only in more recent, but rare treatments, are contemporary environmental problems being examined in a way that goes beyond the biophysical processes at work and encompasses the more diverse set of economic and socio-political influences. Some of this research comes from geographical and environmental studies. Blaikie and Brookfield's *Land Degradation*

and Society (1987) is one such iconoclastic work which stresses the social, political and historical dimensions of one type of unsustainable exploitation. The body of work that comes closest to meeting these requirements is, however, anthropology. Here is a body of work of particular relevance to this thesis, because in anthropology, emphasis on the powerful, rather than the powerless, has formed a relatively constant analytical theme. Of particular note here are the works by Broad (1995), Little and Horowitz (1987), Hecht (1985), Keene Meltzoff and LiPuma (1986) and Schmink and Wood (1987) concerning degradation of tropical forests. Despite the insights they offer, such a broad cross-sectoral approach to analysis of environmental problems has yet to penetrate mainstream environmental management analysis or practice.

The anthropological work above focuses primarily on the state as the main agent of environmental degradation. Some limited consideration is given to the role of individuals, including powerful members of the government and the military, but it does not generally form the core of the analysis. Furthermore, the useful elite research carried out under the banner of modernisation theory during the 1960s and 1970s has been overlooked. Not only did this develop relevant methodological practices, but it also revealed a range of typical ideological, entrepreneurial and socio-political characteristics that, although examined in different contexts at the time, have considerable relevance to resource exploitation. This thesis therefore not only takes a pluralistic approach to the analysis of environmental degradation, but also puts the assessment of elite influence at the heart of environmental management.

Against this background, the need for this research arises because mangrove exploitation in Belize is rapidly increasing. This is widely acknowledged to be degrading the environment. In trying to identify the causes of this degradation, neither technological factors, economic metaphors not biological metaphors are obviously responsible. For example, in the case of Belize (and other regions with low populations), the common neo-Malthusian explanation of environmental degradation is difficult to sustain. Therefore, the search for responsible agents must look elsewhere.

The argument that this research seeks to test is that the causes are partly social, partly economic and partly political. The research gathers evidence to show that pluralist analysis of environmental exploitation is essential to obtain an accurate understanding of resource

exploitation, and that the role of powerful individuals must form a central component of this explanation. The hope is that this understanding will then be used to contribute to the formulation of policy and management interventions that aim to reduce environmental degradation and increase sustainable development.

1.2 Research Objectives

With this goal in mind the present research aims, by analysing the role of elite stakeholders in the allocation and use of mangrove, to improve understanding of its exploitation in Belize. The hypothesis tested is that patterns of, and approaches to mangrove exploitation can be accounted for by the behaviour and influence of elite stakeholders. To investigate this, the specific research objectives are to:-

1. determine the characteristics and extent of mangroves in Belize,

2. identify the principal environmental, economic and socio-political influences on mangrove exploitation,

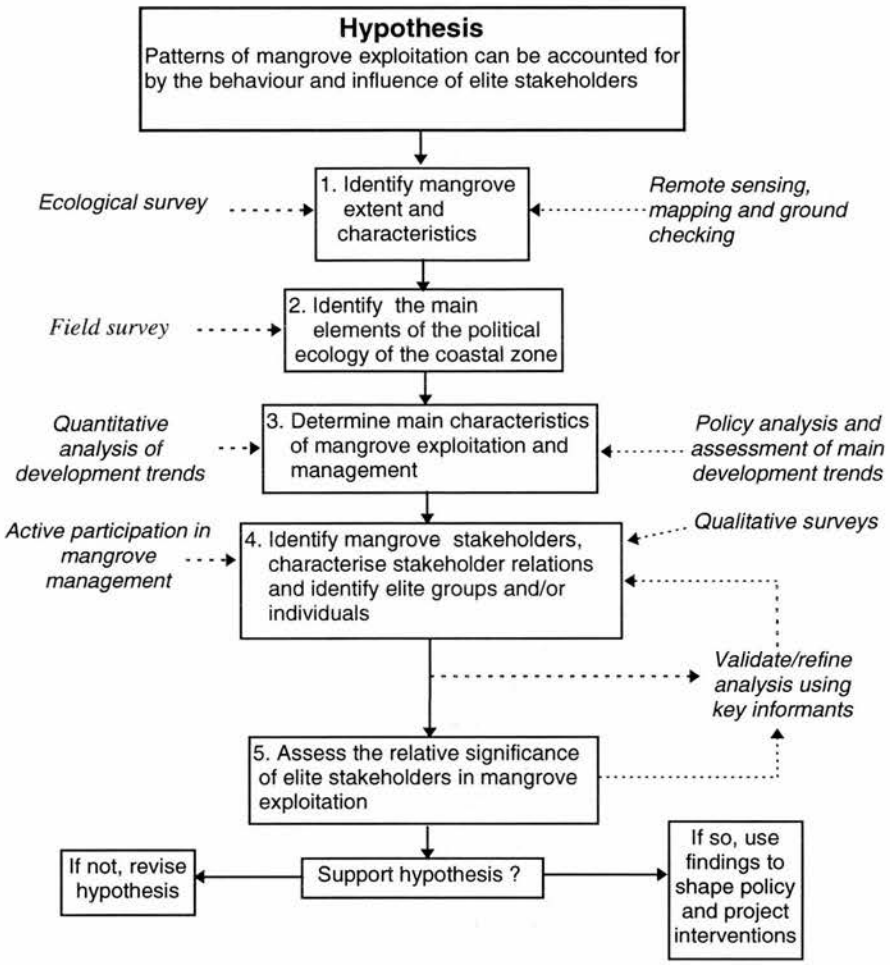
3. identify mangrove stakeholders, and the elite groups amongst them,

4. analyse mangrove exploitation at national and local levels, including attempts at management, and

5. assess elite influence in the exploitation and management and identify some of the mechanisms through which it is exerted.

Figure 1 outlines this as a flow chart. Should the hypothesis be upheld, then resource management efforts clearly need to be attuned to the socio-political reality of elite stakeholders' agendas, in order to improve their effectiveness. This has implications at all levels of environmental management, from strategic environmental policy, through to project design and implementation, and including the way environmental managers are trained. These issues are returned to at the end of this thesis.

Figure 1 The research tasks undertaken to test the hypothesis



Having briefly sketched the background to this research, the remainder of this chapter is divided up into five sections. The first identifies the methodological approaches that have been used in this research. The next two introduce wetlands and mangroves, providing definitions of these terms and highlighting the growing threats these environments face. Then the shift in roles of elites in mediating mangrove use is briefly considered, following the demise of traditional management structures and the rise of modern mangrove management approaches. Finally, the study area is described in Section 1.7 and the thesis structure is outlined in 1.8.

1.3 Research Methodology

Mangroves in Belize are under increasing threat from exploitation. In order to illicit any role that elites are having in this, a 'hybrid' combination of quantitative and qualitative methods has been used. This multiple strategy helped to ensure valid and firm conclusions

concerning elite involvement in mangrove use, which could not have been achieved by sole use of traditional forms of analysis. Further details of the specific methodological approaches relevant to each stage of analysis are given in the appropriate section of the thesis (see Chapters 2-6), but the broader methodological context is discussed below.

1.3.1 Methodological Requirements: It seems that part of the explanation for the absence of elite analysis in environmental management is methodological. Therefore it is important to consider these issues so that they can be overcome. Firstly, the positivist analysis associated with environmental management proves poorly adapted to scrutinising the 'shakers, movers and doers' involved in resource exploitation. Power relations cannot be adequately captured using traditional instruments of statistical and scientific validation. Secondly, even if they could be, there is the belief that such activities prove so contingent on short-term local circumstances that they cannot be generalised in any useful way to a wider range of cases. Whilst social science has generally been subjected to such prejudice from natural scientists (Chambers 1983), it exists in a more exaggerated form when working on elite socio-political activity. There is a common assumption that the 'truth' about what goes on is impenetrable and highly susceptible to misinterpretation, hidden by meetings behind closed doors and unrecorded phone conversations. There also remains some academic snobbery which sees the study of socio-political relations as the pursuit of some wayward conspiracy theory, suited perhaps to the attention of a journalist rather than an academic. Given these constraints, it is possible that the role of key powerful individuals will go unnoticed and unanalysed because the socio-political forces at work do not lend themselves to 'appropriate' styles of analysis. If elites and their socio-political relations are identified as being important in resource exploitation, then it is vital to overcome these constraints. By the careful selection of methodological approaches, much can be done to cut through these supposed barriers. To fail even to try to understand them is also tantamount to disengaging from the reality of decision making in these settings. If actions are to be taken to protect biodiversity or increase the sustainability of development or reduce inequality, then environmental management has to respond to the realities of 'real world' decision making and decision makers. The methodology adopted has thus to be equally 'real world' in its approach.

The methodological tool kit for this thesis has, above all else, to enable the investigation of the particular characteristics of elite stakeholders and the socio-political influences they

bring to bear. It must also respond to three other requirements. The first is the need for a multi-faceted approach which has been achieved using a range of qualitative and quantitative methods. Secondly, it needs to be responsive to the characteristics of the influences on environmental exploitation, highlighted, for example, by Scoones (1997) and Stonich (1993). These are non-linear, spatially heterogeneous and contingent on particular events. The methods chosen therefore must have the capacity to pick up on all these different patterns. Lastly, the local Belizean context of the research also needs to be appreciated. Whilst other important characteristics of Belize are discussed in Section 1.8, several are particularly important in relation to the choice of research methodologies. Belize is a small country, both in terms of its physical size and population. This means that individuals can have a profound impact on resource exploitation, through development projects or land purchase. Even something as simple as the importation of a dredge can have significant ramifications for mangrove use, enabling land owners to get cheaper fill to convert mangroves. In 1996, this in fact took place, and stories about a Minister's interference in the way it was used received considerable local press coverage. The country's small size, and the centralisation of its decision making in Belmopan and Belize City, also encourages the use of rumour and trouble-making as a party political tactic. Rumours concocted for such partisan motives about development projects, corruption, nepotism or other such potentially significant influences on resource exploitation circulate rapidly, and often precipitate policy responses from the government or developers [2]. This highly volatile, dynamic interchange therefore is part of the decision making process and needs to be 'read' and interpreted. With all these local features in mind, the methodological approach needs to be able to capture the particular and idiosyncratic influences on the emergence of patterns of resource exploitation.

1.3.2 Adoption of Qualitative Methodological Approaches: Given the above requirements and issues, working within the Forest Department (FD) for a year in particular, provided an opportunity to observe the key players involved in mangrove use. Contacts were

[2] The most significant incidence of this in terms of resource use in Belize was sparked off by the purchase of forested land by Minute Maid Inc., a Coca Cola subsidiary, to convert to citrus plantations. According to a well-connected American conservationist with long-standing involvement in Belize, the opposition party tipped off Friends of the Earth International, in an attempt to get the project blocked. Internationally, exaggerated figures for its anticipated impact on forest clearance were circulated, and other alarmist tactics used. The suggestion was that this was simply to stop the ruling party achieving a major development that would have won it considerable kudos (D. Weyer, pers. comm. 1989). In the end, for commercial reasons as well as the considerable adverse publicity this proposed project attracted, Coca Cola did not proceed and the majority of the land was donated to a newly established conservation charity called the Programme for Belize (whose subsequent role is examined in Chapter 4). Such tactical use of rumour is certainly not unique to Belize. Duffy (1996), for example, noting recognition by Ellis (1989) in the wider context of African politics, illustrates its specific significance in the politics of Zimbabwean conservation.

also used who were made through previous and subsequent employment and research projects in Belize. Ultimately, these contacts included business people, government officials, Non-governmental organisation (NGO) staff, expatriate consultants, British diplomats, land surveyors, and local residents. This extended engagement, over a period of nine years (1988-1997) formed the qualitative foundation of the methodological strategy designed to meet the concerns raised above.

The context and nature of contacts: Participation in management, and observation of those involved in mangrove use, arose in a variety of situations. Employment with the FD involved attending internal meetings, regular one-to-one contact with the Chief Forest Officer (CFO) and other staff, and acting as the FD representative on the Coastal Zone Management Unit's Technical Committee, where discussions were held about particular developments. Through these contacts, the tensions between different agencies working in the coastal zone became clearly apparent. A rapport was also established with officials from other Ministries, notably Fisheries and Environment Department staff. Spending time in the offices of such people, and witnessing the pressures, constraints and issues they were dealing with, provided the opportunity to observe decision making and management in practice. As well as formal meetings, there were numerous informal opportunities to mix with FD and Fisheries staff in the field, giving people lifts to and from meetings, working long hours in their offices, and socialising at bars, parties and family homes. Many authors underscore the value of this type of contact in data collection. Dexter (1970:16), for example, highlights the value of socialising with office staff, because 'If people accept you, you can just hang around and you'll learn the answers without even having to ask the questions'. As well as yielding a range of information, this interaction provided the chance to test out interpretations of events and observations in an informal environment where respondents felt free to converse.

With a FD counterpart, I was also responsible for enhancing the enforcement of mangrove protection regulations, and through these duties discussed mangrove and development with many developers, recording their responses, arguments and views. Direct and indirect mangrove exploitation, notably by commercial and sports fishermen, pole harvesters, villagers and tourism operators was observed at first hand. Contact was also made with the environmental NGOs involved in mangrove management.

Living in Belize City for one year, plus extended periods of fieldwork on Turneffe Atoll, Caye Caulker, Placencia, San Pedro and Punta Gorda added yet a further dimension to this approach, providing innumerable exchanges with residents, shop keepers, local businessmen, neighbours etc. about the land situation, living in the 'swamp', the problems of political corruption and other relevant perspectives. Taxi drivers, for example, often related first-hand experiences of land deals, corruption, or political patronage. Talking with lease applicants, waiting to see the Minister of Natural Resources, or observing which developers were at the Land and Surveys Department (LSD), whom they were waiting to see, and if foreign, by who they were accompanied, all helped to build up information about the social and political dynamics of environmental management in general, and mangrove exploitation in particular.

Additional contact with key individuals: As well as gathering information from normal conversations held in the day-to-day progress of FD work, there were key individuals who had useful information or perspectives, but who would not normally be encountered. In these instances, meetings were arranged to carry out semi-structured or unstructured interviews, the format widely acknowledged to be highly appropriate for both elite and stakeholder research (e.g. Grimble *et al.* 1995). A mix of specific and open-ended questions were asked, designed to solicit hard data (e.g. dates, land ownership, kinship relations etc.), gain respondents' confidence and obtain their genuine personal beliefs and interpretations of mangrove stakeholder inter-relations (Kincaid and Bright 1957, Dexter 1970). Then interviews proceeded as 'a conversation with a purpose', aimed at encouraging as free a response as possible (Burgess 1982). The length and depth of these discussions varied considerably, depending on the particular knowledge and openness of the individual, and the rapport established. Informants were assured of confidentiality whenever a sensitive matter was covered.

English was the language universally spoken by these contacts, so translation was not necessary. Tape recording of the conversations was deemed inappropriate, given the subject matter being discussed, as respondents tended to be inhibited in answering as freely (Kincaid and Bright 1957). Written notes were taken instead or salient points recorded later on the same day. Special attention was paid to inferences in peoples' answers, as this was often their preferred way of putting confidential or sensitive information. For the same reason, the exact phrasing of significant responses was noted. Occasionally, when grappling

to convey a particular subtlety of meaning, respondents used Creole or Spanish phrases that better captured their point than English. These are occasionally included in the text of the thesis. Government officials were normally interviewed in their offices, and others either in their homes or offices. This provided the additional opportunity to observe the interactions of people. The contacts who contributed views or information over the whole research period are listed in Appendix 1.

Methodological considerations when researching elites: Questions of the correct methodological procedures for elite analysis have only been sporadically raised in the literature on the subject. Whilst most deal with developed country settings, elite analysis in the Third World was undertaken from the late 1950s to early 1970s within political science, under the banner of modernisation theory (e.g. Lipset and Solari 1967). The lessons learnt, and the methodological recommendations from these, were carefully scrutinised for their implications in the context of this research, as well as those from more mainstream texts on social survey in developing countries (Burgess 1982, 1984, Bulmer and Warwick 1993).

The conclusions of elite work carried out by Kincaid and Bright (1957), Dexter (1970) and Hunt *et al.* (1964) raised two specific characteristics of elite respondents. Kincaid and Bright (1957:309) noted the strong tendency for interviewees to slavishly respond with clichés and platitudes. This included a particular proficiency at supplying the answers they guessed were wanted, using the right jargon to do so. As regular attendants of international environmental meetings, the political and bureaucratic elite pick up the phrases and concepts in vogue, and respondents are happy to pepper their answers with the latest phrase to relay their 'shared' concern, or knowledge of a particular issue: 'sustainable' was such a term in use during this research period. Basically, as one experienced development agency specialist put it, certain individuals, particularly at the Permanent Secretary level or above, know how to 'talk the talk'. Clearly, due to the nature of the research, responses were not necessarily taken at their face value and judgement was used to assess their validity.

The second issue raised in the elite survey literature concerns the choice of exactly what is studied. The two approaches traditionally used for elite analysis in the modernisation research work are social background investigation and decision-making analysis, the choice of which being dependent on the form of elite functioning believed to be dominant (e.g. Mintz *et al.* 1976). Results suggest however, that whilst both approaches have yielded at

least some useful evidence, exclusive application of either approach is too limited. What is critical is the ability to examine the *processes* at work and the social origins of the *policies*, rather than simply the agents themselves. This underlined the importance of being 'on the inside' of the main Ministry involved in natural resource decisions, to get a feel for the way resource policies took shape over a particular period.

1.3.3 Adoption of Quantitative Methodological Approaches: To support the above analysis, more standard traditional forms of analysis were also employed. Specifically, these were the characterisation of mangrove communities using ecological survey methods, the mapping of recent and previous mangrove extent from remote sensing and ground truthing, and the analysis of development activities, using land ownership change and sub-division as surrogate indicators of changes in exploitation. For these purposes, databases were established and Geographical Information Systems (GIS) used to store, manipulate and combine the spatial data. By integrating the data in this way, the resulting synergy enabled easier analysis and also meant that when a particular individual or company was encountered, a rapid search could be carried out to retrieve any relevant information on their involvement in coastal development. In total, almost 59,000 items of data were collected and entered onto the databases set up for this thesis. The scope of this type of application of information technology for political ecology research is highlighted by Stonich (1993:19).

For land data in particular, attention was given to common warnings in the development literature about data quality in many developing countries (e.g. Casley and Lury 1987). Belize has a severely under-resourced and poorly managed bureaucracy, which is subject to considerable political interference, so a cautious approach was needed in extracting information. This necessitated comprehensive (and extremely time-consuming) cross-checking of data from several different written sources, using the assumption that if the same information was carried in unrelated documents, then it acquired increased credibility. For example, to ascertain land ownership, records were cross-referenced from the General Registry and the LSD Land Tax books. Where a discrepancy occurred, recourse was made to actually interviewing the local lands officers, real estate brokers or local inhabitants to clarify ownership. Despite such precautions, however, and because of the need to complete the research within a realistic timescale, the caveat remains that data from written records inevitably includes an element of inaccuracy.

Apart from these, other written sources used included:- government pamphlets, party manifestos, texts of political speeches, transcripts of Parliamentary debates, meetings minutes, notices in the government gazette and press, and other miscellaneous official publications by the government printer (e.g. Belize Today). Unpublished research material was also accessed through the Government archive and the Society for the Promotion of Education and Research library (SPEAR). Press clippings also formed a significant information source, specifically from The Belize Times, The Amandala, and The People's Pulse (weekly national newspapers), and two magazines, the Belize Review and Belize Currents. The highly partisan nature of the press provided a useful source of commentary, analysis and exposure of political activities, many of which had ramifications for natural resource use.

This work was carried out over a sequence of research periods in Belize, the basic details of which are listed in Table 1 below. The result was a total of 26 months 'field' experience in Belize, gathered over a period of nine years [3].

Table 1 Summary of all periods in Belize that have contributed to this thesis

Dates of Field work	Type of Field Work	Area Covered
June 1988	Ecological Survey	Belize River delta
May - July 1991	Environmental management issues, ODA	Whole country
July-August 1991	Ecological Survey	Whole mainland coast
May 1992 - June 1993	Mangrove Management, FPMP	Whole coastal zone
May - Sept. 1995	Site surveys, land research, mapping	Mangrove development sites
March - April 1996	Interviews	Belize City, Belmopan
September 1997	Interviews	Belize City, Belmopan

Confidentiality: The nature of this investigation has meant that much of the information obtained is personally, politically or commercially sensitive. In view of this, and the fact that occasional insights were given in confidence, individual identities are frequently suppressed. Either a *sobriquet* is used or they are referred to as Respondent 1, Respondent 2, etc. Where the anonymity of the source is not essential, a broad indication of the respondent's position and/or status is given. Examples include the Chief Forest Officer, Fisheries Administrator and Commissioner of Land and Surveys. These contacts are listed in Appendix 1. Only where information is uncontentious and relates to a particular person, have actual names been used.

[3] As a result of this work, the following publications have been produced or contributed to:- Zisman 1989, Zisman 1992, Zisman 1993, Zisman 1996, King *et al.* 1993, King *et al.* 1992, Furley and Ratter 1992, and Furley and Munro 1993. Preliminary mangrove mapping results were published in Spalding *et al.* (1997).

1.3.4 Frameworks Used in Analysis: The thesis uses two conceptual approaches. The first may be generally referred to as political ecology and is described in more detail in Chapter 2. Basically it is a pluralistic and multiple scale approach to understanding environmental exploitation. It seeks to improve understanding of the real world processes of environmental exploitation by combining human ecology, political economy and environmental science (Stonich 1993, Bryant 1992, 1997). This thesis employs a political ecology framework in a comparable way to the combination of quantitative and qualitative techniques adopted by Bassett (1988) in his political ecology analysis of the Ivory Coast, by Grossman (1993) in his work on St. Vincent, and by Stonich (1993:19) in Honduras.

The second conceptual approach is provided by stakeholder analysis (SA), an emerging technique beginning to gain wider use in natural resource management (see Grimble and Chan 1995). It draws on a range of concepts and methods from management science, rapid rural appraisal, common property resource theory, environmental economics, political economy and political ecology. It helps to understand the objectives of the stakeholders who use and manage the environment and the trade-offs they face between objectives. From initial investigations (e.g. Chan 1994) it is well suited to penetrating the social, economic and political relations that produce differentials in the way individuals and groups access and exploit natural resources. Its characteristics and application are also described in more detail in Chapter 2. Prior to this study, neither political ecology nor SA had been applied specifically to scrutinise the role of elite individuals in Belize.

1.4 Mangrove Wetlands: Definitions, Status and Trends

The natural resource chosen to test the elite stakeholder hypothesis is mangrove, a mainly tropical type of wetland principally restricted to brackish and saline environments (Tomlinson 1986). The justification for this choice arises from the fact that mangroves are inhabited by millions of people world-wide, and contribute directly and indirectly to their livelihoods with an unparalleled breadth of goods, services and attributes. This in turn leads to a broad constituency of stakeholders, making it highly suitable for SA. The fact that mangroves are also under increasing threat (Saenger *et al.* 1983) underscores the urgency of understanding their exploitation, in order to enable the introduction of more effective management. Estimates suggest that globally, over 50% of mangroves have already been cleared. The importance of the remaining mangrove ecosystems is

underscored by their recognition in Agenda 21, the most recent and widely adopted international environmental resolution (Spalding *et al.* 1997).

1.4.1 Wetlands Definition: Since mangroves are a type of wetland, the definition of this environment makes a good starting point to show the broader context of this mangrove research. Hydrology is the most common basis used to define their extent. Winpenny (1991), for example, positions them as transitional lands between terrestrial and aquatic ecosystems, where the water table is usually at or near the surface, or the land is covered by shallow water. The second approach, commonly used in North America, is based on the presence or absence of particular species categorised as wetland plants. Self-evidently, this is the appropriate approach with mangroves, a set of wetland species. Their exact characteristics will be returned to shortly, but for the purposes of setting the wider context, it is important to explore the trends in wetland exploitation in general, and coastal wetlands in particular.

1.4.2 Wetlands Status and Trends: Whilst Huxley (1978) suggested that the rise of civilisation coincided with the clearance of trees, it could equally be argued that it has been accompanied by the conversion of wetlands. Globally, estimates suggest that since 1910 wetlands have diminished by approximately 50% (Maltby 1986). Concern has become sufficiently great that wetlands have an international conservation convention specifically targeting their protection [4]. The increasing concentration of human activities within the coastal zone has meant that coastal wetlands in particular have been impacted, a trend which, in the tropics, has most affected mangroves.

Some 180 nations (more than 90%) have coastal zones (Hillen 1993). Whilst wide regional variations exist (Burbridge 1993), generally they offer a combination of characteristics that has encouraged their exploitation and settlement (Hilderbrand and Norrena 1992). Coasts are frequently adjacent to highly productive ecosystems (in the tropics, specifically estuaries, mangroves, sea grass beds, coral reefs, and littoral forests), which furnish rich food resources. Seas and rivers provide convenient means of transport, a feature of historical importance but also one which has grown in significance with the patterns of resource expropriation instigated by colonialism and, in many cases, consolidated by modern systems of trade. Coastal weather conditions are frequently more equable than

[4] The International Convention on the Protection of Wetlands of Importance Especially As Waterfowl Habitat (the Ramsar Convention) was convened in 1971.

those inland. Since the mid-1960s, tourism (commonly considered to be the world's largest 'industry', and with an emphasis on sun, sand and sea locations) has greatly added to coastal development. Coastlines also provide access to raw materials (coral, sand, gravel, used in construction and in-fill materials, offshore oil and gas), to wind energy, and to convenient means of waste disposal, using the diluting and dispersing properties of rivers, seas and oceans. Therefore, despite the susceptibility of many coastal areas to natural hazards (Blaikie *et al.* 1994), people have concentrated along the coastal zones of most maritime nations for thousands of years (*Ibid.*, ,Macintosh 1983). Whilst figures for the historical proportion of people inhabiting coastal zones are not available, recent estimates suggest that due to population growth and immigration 60% of the world's population now lives within 60 km of the coast (World Bank 1992). This concentration is projected to increase within the next 20-30 years (FAO 1991) and by 2020, three quarters of the world's population may be living within 60km of the sea (UNCED 1993). Furthermore, coastal populations are becoming increasingly urbanised, concentrating economic activities and environmental impacts into relatively small areas.

1.4.3 Coastal Development Pressure in the Third World: Out of the 180 maritime nations, 120 contain mangroves and of these, the great majority are classed as Third World countries (Spalding *et al.* 1997). As approximately 95% of future population growth is expected to be in the Third World, it is here that development pressure is most likely to escalate. Knecht and Cicinsain (1993) suggest that two thirds of the Third World population will live along the coast by 2000, exacerbating already severe competition for access to coastal resources and conflicts among different stakeholder groups (Burbridge 1993). Already, wetlands in tropical or sub-tropical regions (approximately 2.64 million square kilometres, or 56% of the global total) (Mitsch and Gosselink 1993) have been heavily impacted. More than 60% of the original wetlands have been converted in Asia, and just under 30% in the Afro-Tropics (WRI 1992). Of these, the majority have been coastal.

1.5 Mangroves: Status, Prospects and Management Needs

1.5.1 Mangrove Definition: In its taxonomic sense, the term mangrove is the name given to the salt-tolerant, predominantly tropical, tree, shrub, palm or fern species that grow above mean sea level in the marine inter-tidal zone (Robertson and Alongi 1995). Mangrove is also

widely used in the generic sense to describe the whole community these species form. Alternatives like mangal (Macnae 1968), mangrove forest, mangrove swamp and mangrove ecosystem are also commonly used in this sense.

The precise delineation of mangrove species still continues to cause debate. Tomlinson (1986) has put forward the most widely accepted definition, based on the several highly specialised adaptations shared by mangroves, notably exposed breathing roots, support roots and buttresses, salt excreting leaves and viviparous water dispersed propagules (Saenger 1982). Individual species do not necessarily possess all these features, leading Tomlinson (1986) to devise a three-fold division into *strict mangroves, minor mangrove components,* and *mangrove associates.* According to Tomlinson, strict mangroves must:-

i. have *complete fidelity* to the mangrove environment,
ii. constitute a *major role* in the community and be able to form pure stands,
iii. have *morphological specialisations* to their environment,
iv. have some physiological mechanism for *salt exclusion*, including excretion,
v. be *taxonomically isolated* from relatives, at least at the generic level and often at the sub-family or family level.

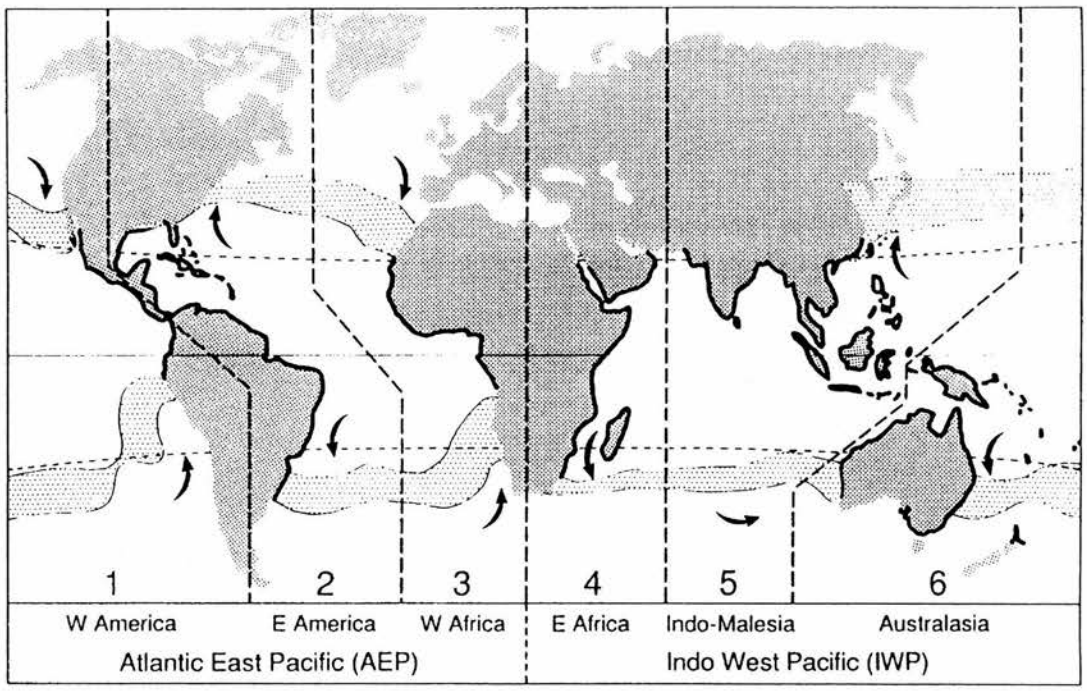
Accordingly, Tomlinson (1986) identifies 34 true mangrove species, from nine genera and five families [5]. Eighty other species, from 35 families are classified as either minor components or mangrove associates. Minor mangrove components are those which Tomlinson states form a conspicuous element of the vegetation (p.26) and thus tend to occupy peripheral locations, rarely forming pure stands. Mangrove associates are the group with the least affiliation to mangrove habitats, since they are able to survive in terrestrial environments.

1.5.2 Global Mangrove Biogeography: Mangroves are pan-tropical, spread across six major biogeographic zones (Saenger *et al.* 1983) and are largely confined to the regions between 30°N and 30°S of the Equator (Figure 2). Notable exceptions beyond this are to the north in Bermuda (32° 20'N) and Japan (31° 22'N) and to the south in Australia (38° 45'S), New Zealand (38° 03'S) and on the east coast of South Africa (38° 59'S) (Spalding *et al.* 1997). These modern distribution patterns are the result of a wide range of biophysical factors. Most significant are low sea surface and air temperatures (particularly frosts) which

[5] Duke (1992) gave somewhat different figures, proposing 69 species of mangrove plants from some 20 families.

cause mangrove mortality. Rainfall has an influence through its impact on salinity. High salinity levels in seawater and inter and supra-tidal areas, particularly in arid or highly seasonal areas, generally restrict mangrove development. Tides are the other main regional influence, with large ranges responsible for broader mangrove belts. More local factors include soils, coastal geomorphology, river discharges, mineral availability, winds, currents and wave action.

Figure 2 Global mangrove distribution and major biogeographic regions



Source: Tomlinson (1986) Saenger *et al.* (1983)

1.5.3 Mangrove Status and Trends: Overlain on this natural distribution is the impact people have had on mangrove extent. Perhaps the most comprehensive historical change has been brought about around the Arabian Sea, where the naturally sparse mangroves have been eradicated after centuries of use for fuel and fodder. Elsewhere, human impacts are becoming more widespread and intensive. An estimated 75% of tropical coastlines were dominated by mangroves prior to substantial (and on-going) reduction caused by human activity. Those remaining cover approximately 75,173 square kilometres in South and Southeast Asia (41.5%), 18,789 square kilometres in Australasia (10.4%), 49,096 square kilometres in the Americas (27.1%), 27,995 square kilometres in West Africa (15.5%) and 10,024 square kilometres in East Africa and the Middle East (5.5%), totalling 181,077 square kilometres (Spalding *et al.* 1997).

Losses of mangroves slightly exceed the overall extent of wetland clearance, with a 55% decline in the Afro-tropical Realm from an original area of 87,870 square kilometres and by 58% in the Indo-Malayan Realm from an original area of 94,512 square kilometres (WRI 1992). However, wide variations exist between and within many countries. Mangrove clearance and degradation continues, and has become a matter of international concern (Maltby 1986:28, Dugan 1990, 1993), exacerbated by the threat of sea level rise (Rao 1991). Consequently, there is a pressing need to sustainably manage the mangrove that remains (Pons and Fiselier 1991).

Globally, the causes of alteration are diverse, and vary significantly from region to region. In general though, the principal activities leading to their *replacement* (commonly referred to as reclamation) include aquaculture, agriculture, industry, urban expansion, waste disposal, tourism developments, port and other transport facilities. Those leading to their *degradation* include water pollution, over-exploitation for fuel wood, timber extraction, and alteration in hydrological regimes, such as that arising from up-stream irrigation and power generation (Saenger *et al.* 1983).

Status and trends in exploitation of mangroves in Central America and the Caribbean: Mangroves in Belize account for roughly 2% of the mangrove left in the Americas and 6% of the mangrove remaining in Central America (Spalding *et al.* 1997). A brief examination of mangroves in the region shows that these face relatively low development pressure in comparison to other Central American and Caribbean nations. The relatively high proportion of Belize they currently occupy, whilst partly an accident of geography, is also a reflection that clearance has been relatively limited in extent (Table 2). At a broad scale, the most noticeable trend on the isthmus is that although the small tidal range of the Caribbean restricts mangrove development, they remain more intact in comparison to those along the Pacific (Leonard 1987). There, they have been substantially altered by conversion to agriculture, aquaculture, industry and settlement, and over-exploitation for fuel and construction materials. Figures giving the original extent of mangroves in Central America do not appear to have been calculated, and data on clearance in Central America are poor (Jimenez 1986, Suman 1994). Obtaining a definitive picture of loss in the region is therefore difficult. However, as a best estimate, Jimenez (1986) quotes reported losses of 385ha/yr in Nicaragua, 560ha/yr in Guatemala and 45ha/yr in Costa Rica. Most of the conversion has been to rice fields, pasture, salt evaporation ponds, and more recently, shrimp ponds

(Leonard 1987). However, the most serious mangrove management problem in Central America is not conversion but degradation (Jimenez 1986). Particularly significant are over-cutting for fuel, in countries where wood is the main energy source (e.g. El Salvador), and pesticide pollution, especially for cotton and vegetable production on the Pacific coast.

Table 2 Per cent of Central American countries occupied by mangroves

Country	% Mangrove
Belize	3.4
Panama	2.2
Honduras	1.3
El Salvador	1.3
Nicaragua	1.2
Costa Rica	0.8
Mexico	0.3
Guatemala	0.2

Source: Spalding *et al.* (1997). The figure for Belize is from this thesis (see Chapter 5).

As a consequence of these trends, Leonard (1987) gives figures for estimated mangrove reduction in Guatemala as 92% since the late 1950s. In Costa Rica, 40% of the original mangrove cover had gone by 1979 and in El Salvador, some 50% had been cleared between 1900 and 1975.

On the Caribbean islands, mangroves are generally more vulnerable, often being confined to isolated pockets by a combination of steep topography, small estuaries and small tides (Lacerda *et al.* 1993). Patterns of alteration do vary, reflecting the islands' socio-economic diversity. Causes are relatively varied, with tourism representing a notable recent addition to longer-standing impacts from agriculture and extraction for fuel (Bacon 1993, Padrón *et al.* 1993). The resulting loss is relatively high. As an example, Lugo (1988) gives the original area of mangroves for Puerto Rico at 30,000 ha, reduced by 50% by 1975, mainly by transport, housing, marinas and landfill, with recreation and pollution degrading additional areas.

The extent and nature of mangrove alteration in Belize has been assessed as part of this thesis (see Chapter 5). The results indicate, that in comparison, rates of mangrove alteration during the late 1980s, might reasonably be estimated at roughly 48 ha/yr. By 1990,

approximately 98% of its original mangrove still remained. Whilst modest by regional standards, the rate of loss is rapidly increasing (Murray 1995), and it is therefore imperative to obtain an understanding of the processes behind this trend, so that effective conservation measures can be put in place.

1.5.4 Growing Concern Over Mangrove Loss: Despite the fact that, globally, millions of people depend on and live in mangroves (Macintosh 1983), their clearance was not considered an issue until relatively recently, when losses accelerated. Concern began in the 1960s as their resource values became better understood (Maltby 1983) and the scale of losses became apparent (Saenger *et al.* 1983). Following intense analytical scrutiny, mangroves are also better understood as highly productive ecosystems, providing a wide range of goods, services and attributes (Hamilton and Snedaker 1984). These have significant economic, ecological, nutritional and recreational values, locally and off-site, and a large body of literature has built up which examines these numerous components. Odum and Heald (1975), Turner (1977, 1992) and Lopez *et al.* (1988) amongst many others have, for example, analysed the role of mangroves in sustaining near-shore fisheries production. Related work includes mangroves' role in the life cycle of many commercially important fisheries and aquaculture species (e.g. Macintosh 1983, FAO 1982, Kapetsky 1983). Other studies have emphasised the role of mangroves in coast protection, reduction of storm damage, bio-purification (Robertson and Phillips 1995, Landers and Knuth 1991, Chiang and Lee 1986), as a sink for organic and inorganic detritus, nature conservation, provision of forest products, and recreation and eco-tourism (all elaborated on in Chapters 3). With so many potential benefits, why is mangrove degradation so widespread?

1.6 Mangrove Management and Elite Influence

Communities living in association with mangrove environments have evolved social mechanisms to govern the allocation and extraction of resources (e.g. Davis 1985). The majority of these traditional forms of management have, however, been destroyed or weakened in the wake of European colonisation. Its new rules of resource access instigated very different forms of legal and administrative control [6].

[6] This is precisely what occurred in Belize. Archaeological evidence suggests that prior to colonisation, the coastal zone was widely inhabited, hosting various settlements, trading camps and salt works. However, with the arrival of the Spanish in the 1500s, the Mayan population was decimated and the remainder withdrew to the interior (McKillop and Healey 1989). No original aboriginal forms of management remain.

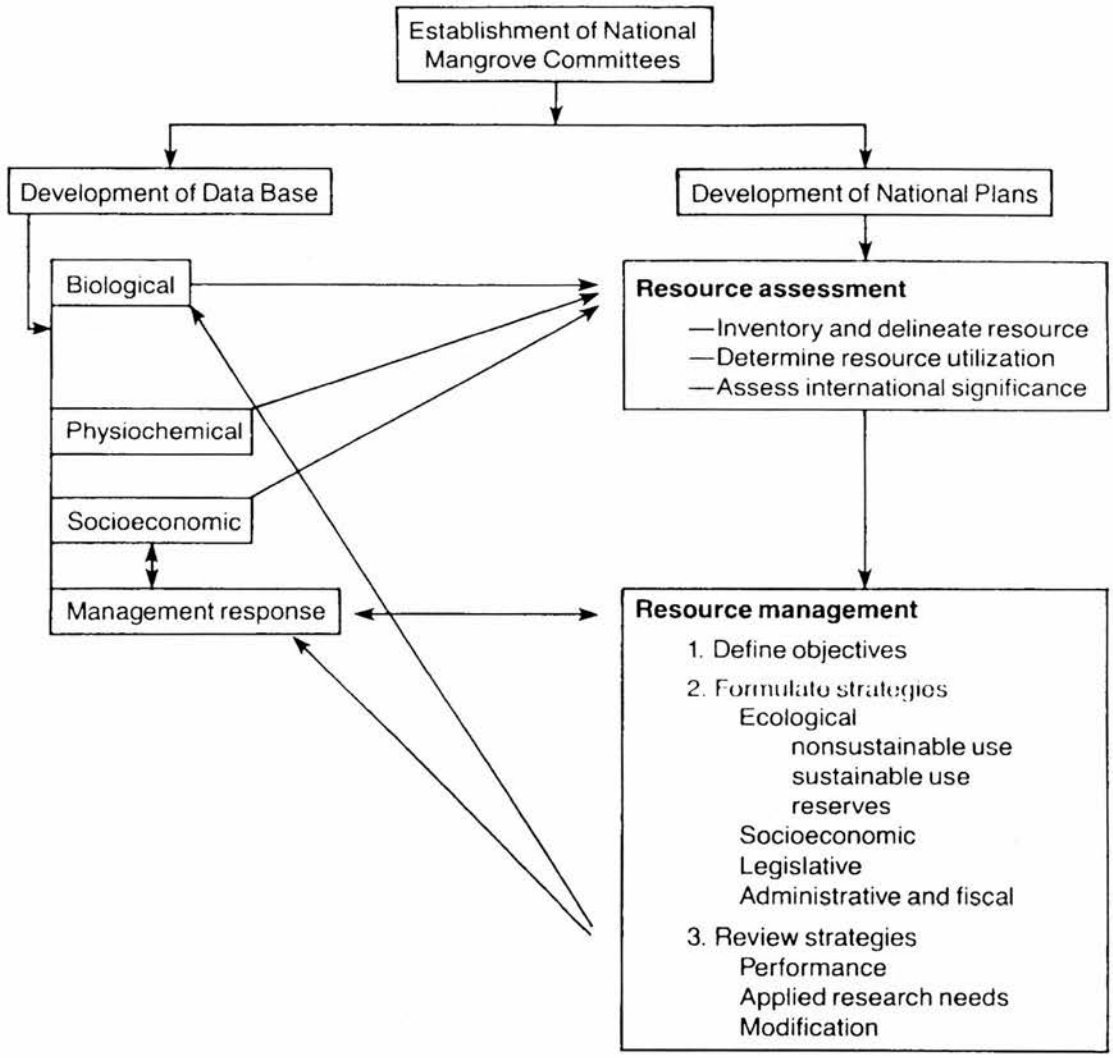
These have developed further as a result of heightened concern over pressures on the coastal zone. 'Coastal Zone Management' (CZM) has emerged as a field within environmental management, and consists of a range of tools and approaches configured to deal with the particular dynamism, inter-linkages, and multiple use of the coastal zone. CZM seeks to encourage compatible multiple use of the coastal zone, resolve conflicts of interest and protect the environment by instigating new structures for controlling coastal resource use. Its origins are relatively recent, commonly identified as the 1972 Coastal Zone Act legislated in the USA in 1972. Its passage reflected the momentum for general wetlands conservation during the early 1960s (Maltby 1986:93). Within CZM, initiatives to introduce multi-purpose sustainable mangrove management have become widespread (Pons and Fiselier 1991) [7].

Following the breakdown of traditional forms of management, the commonly adopted (or imposed) approach has been centralised state control of resource allocation and use. This has gone hand in hand with the removal of most intertidal areas from local control, firstly vested in 'the Crown' during British colonialisation, and then subsequently transferred into state ownership. In this process, the role of traditional local elites, who had overseen the allocation of coastal resources, has generally been replaced by state politicians and bureaucrats. These operate instead through a centralised state structure, often far removed from the locations involved.

As well as changing the composition of the elites, modern types of management also differ widely from traditional modes. Whether externally fostered by aid agencies or locally designed, they have commonly adopted a technocratic approach. This typically consists of an analysis of land use, a survey of the resource, consideration of the legal framework necessary to achieve control over exploitation, and the prescription of activities required to achieve this. Examples conforming to this format are found in Bacon *et al.* (1988), UNDIESF (1982), Sorensen *et al.* (1984), Keene Meltzoff and LiPuma (1986). A typical format for this type of technocratic management approach is shown in Figure 3.

[7] Silvicultural management of mangroves for harvesting timber and secondary forest products has been established for a much longer period (e.g. Watson 1928), but this is essentially intra-sectoral and not comparable to the type of multi-sectoral mangrove management being discussed here.

Figure 3 **The procedure recommended for mangrove management by the FAO, as an example of the standard technocratic approach**



Source: Saenger *et al.* (1983)

These technocratic approaches to mangrove management pay little or no attention to the influence of socio-political relations on mangrove exploitation. In the very few instances where mangrove management does examine such issues, it tends to address only mechanisms of traditional tenure (e.g. Broad and Cavanagh 1993). This is in stark contrast to work on tropical deforestation and desertification, for example, where analysis of socio-political issues is widely established. This is yet to consistently take place in the context of mainstream mangrove management.

The majority of mangrove management attempts have also fallen short of their goal of achieving sustainable use, and the rate of mangrove destruction is increasing (Spalding *et al.* 1997). This is despite the fact that mangrove values are more widely recognised than ever before (Hutchings and Saenger 1987). Keene Meltzoff and LiPuma (1986), amongst others have argued that a major cause of this failure is the nature of these 'Western' technocratic management approaches, which they consider inappropriate to the socio-political contexts of developing countries. The growing acceptance of their conclusions is reflected in Chapter 17 of Agenda 21, which calls for new forms of coastal management. This research argues that analysis of, and adaptation to elite stakeholder influence must become an integral part of these new approaches if they are to succeed.

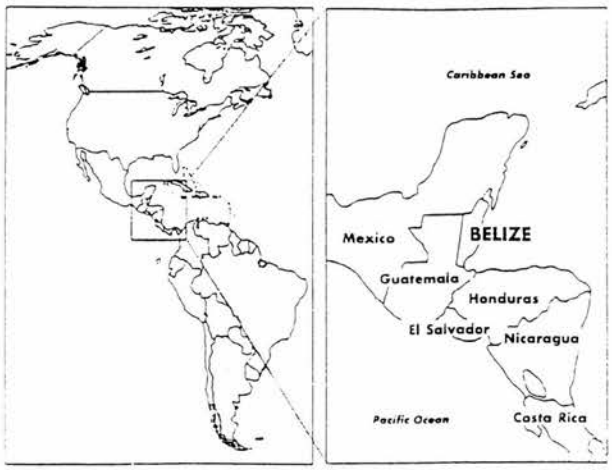
1.7 The Study Area

1.7.1 Justification for Selection of Belize: Developing countries include a wide range of political systems and contain the great majority of the estimated 18 million hectares of mangrove still remaining (Maltby 1986, Spalding *et al.* 1997).

The need to relieve poverty is also most acute in these countries, and since the livelihood of many millions of its inhabitants depends on coastal ecosystems, the challenge is to promote development without degrading the environment. Since the governance of these nations has come under scrutiny in relation to achieving development which is sustainable, the choice of a developing country was appropriate for this research. Belize was selected on several counts, but before they are outlined, an introduction to its main characteristics is appropriate.

Belize covers 22,963 sq. km of land, including 689 sq. km of offshore islands, locally known as 'cayes' (Hartshorn 1984) (Figure 4 and 5). Its coast stretches approximately 280 km, from the Rio Hondo in the north to the River Sarstoon in the south. Belize is 278 km long and 109 km at its widest point, between Belize City and Benque Viejo. It is about twice the size of Jamaica, roughly the size of Wales, and slightly bigger than the republic of El Salvador, making it the second smallest country in the Americas (Wright *et al.* 1959).

Figure 4 **Location map of Belize showing global and regional setting**



Source: Iremonger and Brokaw (1994)

Economically, whilst tourism has developed into the second largest contributor to the economy, exports of agricultural, fisheries and aquaculture products remain more significant in terms of employment, foreign exchange earnings and land use (World Bank 1996). Politically, Belize is something of an anomaly in Central America as the only former UK colony, formerly known as British Honduras. It gained full independence in 1981, but has a long history of participatory democracy, relatively free from military influence. In this respect, it has far more in common with other Caribbean commonwealth nations. Culturally, it shares both Central American and Caribbean features (both with a heavy North American reference). Ethnically, it comprises Mestizo, Mayan and Afro-Caribbean populations. Functionally and spatially, the first two are broadly allied to agricultural pursuits and the latter to urban ones. Other small but significant elements of the population are Mennonite and foreign (mainly North American) communities functionally allied to agriculture and tourism respectively.

Whilst certain minor characteristics inhibit research in Belize (for example, see Correa Finney 1985), these are far outweighed by favourable considerations. Firstly, even though the extent of its mangroves is relatively modest (40th in the world, by area (Figure 6), equivalent to 0.47% of the remaining total), they are ecologically allied to reefs and other marine habitats of global importance (McField *et al.* 1996). Belize's reef is the largest barrier reef in the Western Hemisphere (Perkins and Carr 1985) and the fifth longest in the world. Its quality has only recently been fully identified, and has led to the 1997 designation of large sections as a World Heritage Site. Analysis of mangrove use in Belize must therefore be seen in the context of the protection of a unique, diverse and globally important coast.

Figure 5 **Belize's main physical features, infrastructure and settlements**

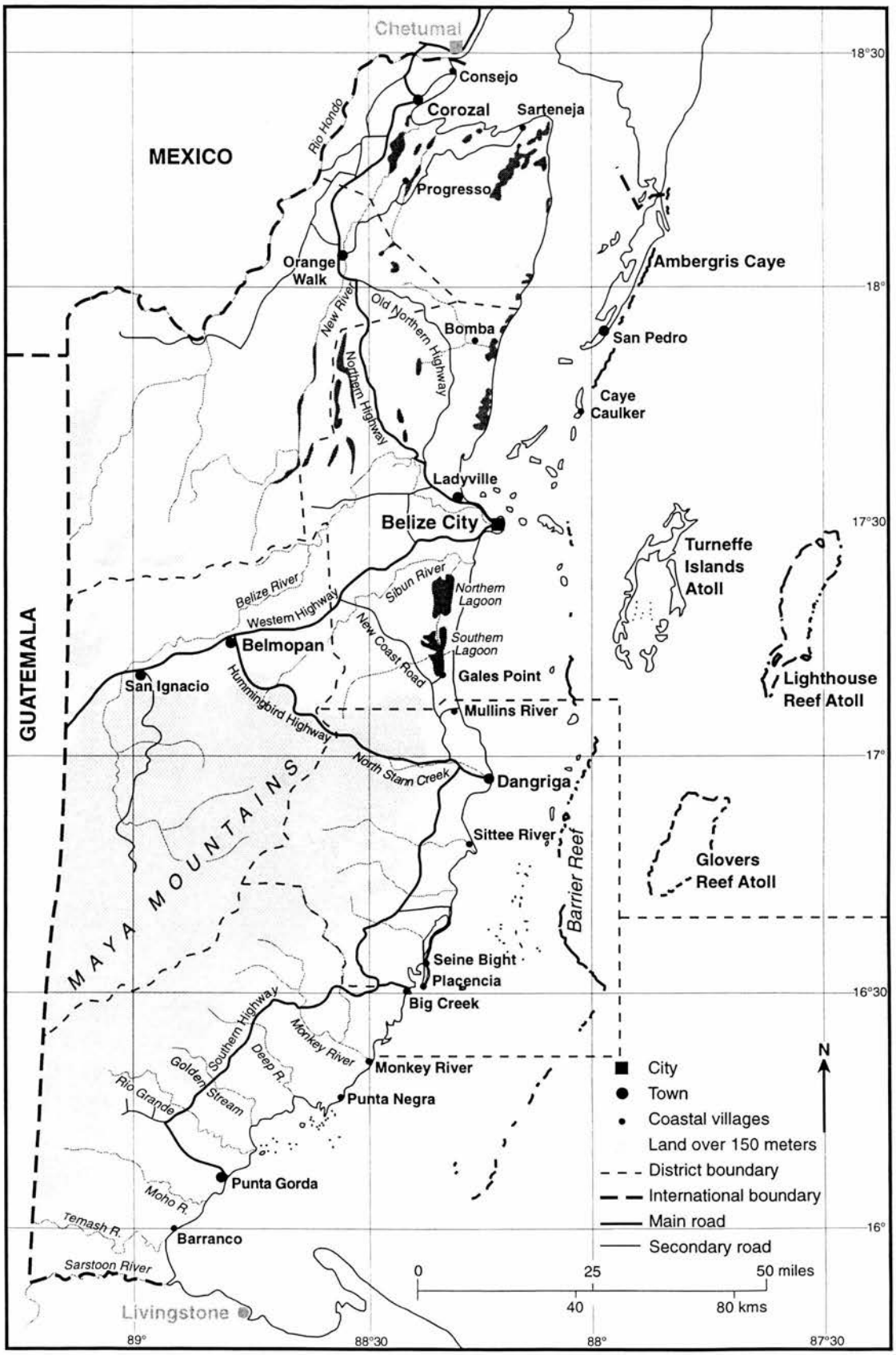
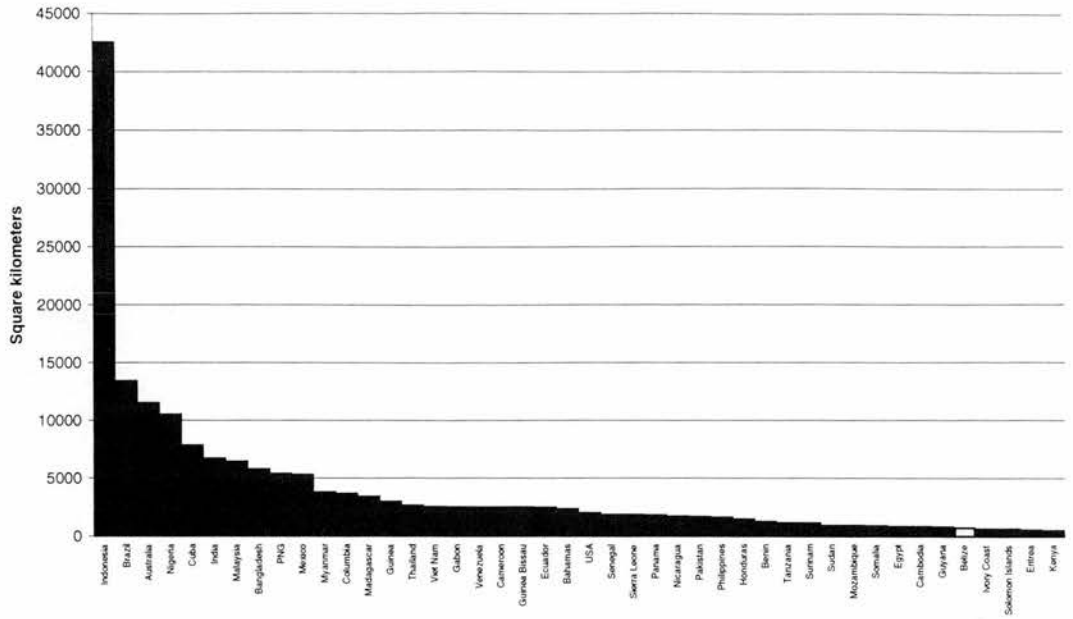


Figure 6 Mangrove extent in descending order for top 44 mangrove countries



Source; Spalding *et al.* (1997)

Secondly, the opportunity to work for the FD provided insight into 'on the ground' dynamics of resource management as already discussed. Thirdly, because of its small size Belize allowed national and site-specific overview material to be gathered within the research time frame. Fourthly, in the last decade, Belize has experienced rapid economic growth, creating the opportunity to study changes of sufficient order of magnitude to be detectable, especially in terms of the rate of mangrove clearance and land ownership change. Fifthly, at the outset of the research, Belize was embarking on the formulation of a coastal zone management plan, following recent IUCN guidelines (IUCN 1993, Price *et al.* 1990). As the research period for the thesis spanned the duration of plan formulation, there was an opportunity to influence management positively by evaluating the importance of socio-political relations and the CZM approach employed. The sixth consideration was that other nations are in a comparable situation to Belize, specifically those characterised by low population densities along coastlines with high potential for exploitation by resource mining and/or tourism (e.g. Mozambique), and those where coastal settlements are expanding into mangroves. Therefore, research findings from this national case study should also have relevance to other countries. Finally, the most important factor of all was Belize's unique potential for actually achieving sustainable development. As will be explained in Chapter 4, conservationists believed that if sustainable development could be

achieved anywhere, it would be in Belize. This makes it an important case to examine so that implementation of, and obstacles to sustainable development can be better understood.

1.8 Thesis Structure

The thesis is divided into eight chapters. The first two introduce the research. The following five provide analysis and findings, and the final one gives the conclusions.

In more detail, after this introductory chapter, Chapter 2 considers the theoretical approaches useful for analysing the role of elite stakeholders in mangrove exploitation. Specifically, consideration is given to the emergence of power in Third World environmental discourse. The field of political ecology is then defined and its application to the Third World reviewed to identify components relevant to this analysis. Elite theory itself is then re-examined in the search for applications relevant to environmental management. Finally, the socio-economic and socio-political features of mangrove-holding nations are examined, to characterise the contexts in which mangrove exploitation and management take place. In Chapter 3, environmental aspects of Belize's coastal political ecology are studied. The physical and ecological traits on which the resource value of mangrove is based are assessed, and the extent of mangrove alteration is quantified. Chapter 4 adds analysis of the conflicting development pressures acting on Belize's political elite. In particular, it examines the interaction between conservation stakeholders lobbying for sustainable development and the Minister for Natural Resources. It also elaborates on the other development pressures acting on the political elite, in particular the need for economic diversification. In Chapter 5, the actual characteristics of mangrove development are examined, through mapping of mangrove extent and analysis of government land development records. In Chapters 6 and 7, two sets of activities are scrutinised to gain more detailed insight into motivation and influence in mangrove exploitation. The operation of mangrove protection legislation is also considered in Chapter 6, to investigate elite influence. In Chapter 7 the issue is explored further using case studies of particular developments. In the concluding chapter, findings are brought together to define the critical elements of elite stakeholder activity which are influencing mangrove alteration in Belize. Finally, the conclusions are drawn on the significance of elite stakeholders in mangrove alteration. Recommendations are then made to enhance mangrove management so that they are explicitly adapted to the socio-political realm in which they have to function.

Elite Influence in Mangrove Use? 2

2.0 Introduction

The purpose of this chapter is twofold. Firstly, it hypothesizes the potential structures of elite influence in Third World natural resource exploitation and gathers evidence to evaluate it. Secondly, it establishes the suitability of political ecology and stakeholder analysis as approaches to test elite influence in mangrove exploitation in Belize.

To these ends, the chapter starts with an overview of the socio-political characteristics of mangrove nations, which allows, at the very broadest level, the basic framework for elite operation to be inferred. Consideration is then given to the growing pressures on those in power to adopt a more sustainable approach to resource use. The detailed mechanisms of socio-political influence relevant to this research, specifically power, elite characteristics and patronage are discussed next. As part of the discussion, existing evidence is assembled for elite significance in resource use, drawing from the literature on elites, environmental issues and the larger and longer standing body of development studies. This information is used to inform the search for elite influence in the following chapters. Attention is then given to the existing evidence of elite influence in mangrove exploitation. In its second part, Chapter 2 justifies the choice of the 'political ecology' and 'stakeholder analysis' frameworks to shape this research. Previously, the two have not been used together in the analysis of environmental issues in developing countries. The thesis therefore aims to augment the use of both of the approaches.

In combination, Chapter 2 examines the case for elite significance, validates the methodological approaches to be used and delimits the range of factors to be scrutinised.

2.1 Pressure on the Powerful: The Growing Socio-political Emphasis in Environmental Discourse

2.1.1 The Socio-political Context of Mangrove Management: Considering the size of the literature on mangrove management, there has been only limited attention to the socio-political contexts in which management is practiced. Even simple but fundamental contexts,

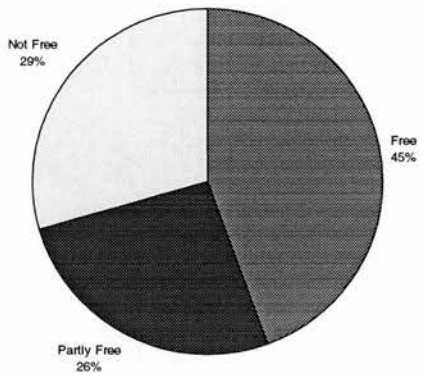
such as the level of centralised decision-making in government, the level of influence of the military, and the degree of democracy are rarely included in the literature on mangrove management needs or approaches (e.g. Saenger *et al.* 1983, Adegbehin and Nwaigbo 1990, Asian Development Bank 1989, Aksornkoae 1989). It would appear that the over-representation of natural, as opposed to social scientists in environmental management, is one factor. The caution of environmental professionals about jeopardizing their careers by raising such issues is also a contributory concern (Chambers 1980). In any case, given the explicit attention to good governance in overseas aid, and the growing dissent at grassroots level to mangrove degradation (e.g. Lopez 1997), this reticence now seems especially unwarranted. Furthermore, should this hypothesis be supported, then it actually inhibits the correct diagnosis of mangrove management issues. In addition, given sustainable development's central tenet of greater public participation in natural resource decision making (Redclift 1984, Brundtland 1987), the explicit examination of such socio-political components is vital.

In embarking on socio-political analysis, simple categorisation into parliamentary democracy, single party state and other similar divisions mask too much socio-political variation to reveal any useful insight. For example, as Henry (1991:1) shows, the authoritarian tendencies of the Caribbean's political systems 'have for the most part manifested themselves within formal frameworks of liberal democracies'. Using a finer level of civil and political indicators, the socio-political context of countries can however, be portrayed. Results for countries with mangroves are shown in Figure 7 (Appendix 2 gives a detailed explanation of the Freedom Index from which the data are drawn). Results show that whilst 45% of mangrove countries (53 nations) have basic democratic rights and political structures, for the remaining 55% (66 countries), these rights and structures are limited or absent.

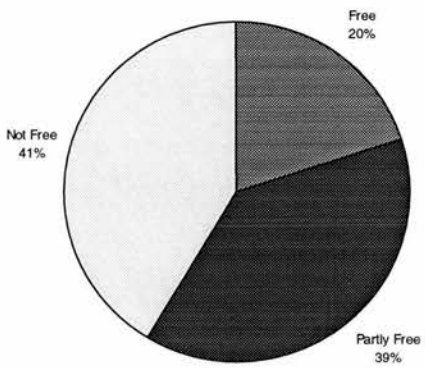
More revealing is the socio-political context of mangroves based on their area. Out of all the world's remaining mangrove, only a fifth occurs in countries with fully democratic participation in the political process. Even more startling, because of the large areas of mangrove in Indonesia, Nigeria, Cuba, Burma and Viet Nam, 39% of the world's mangroves are in countries classified by Freedom House as the most devoid of political rights. It seems that by too frequently focusing on site-specific management contexts (e.g. Adegbehin and Nwaigbo 1990), the obvious 'big picture' framing mangrove management has been ignored.

Figure 7 The socio-political regimes of countries with mangroves

A. No. of mangrove countries that are free, partly free and not free

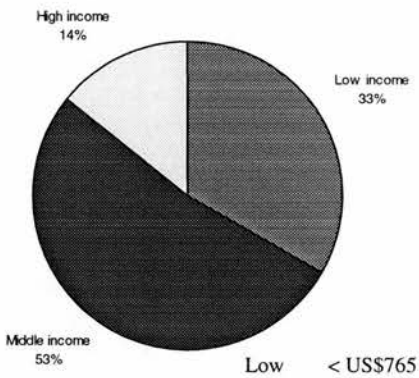


B. Area of mangroves in countries that are free, partly free and not free



Source: Socio-political indicators from Freedom House (1996) and mangrove areas from Spalding *et al.* (1997)
For 7A, the number of countries in each class is:- Free = 53, Partly Free = 31 and Not Free = 35

Figure 8 Income categories of countries



Source: World Bank (1996)

Low	< US$765
Middle	US$766-9385
High	> US$9386

Before moving from the global perspective, one other consideration is illuminating. For the mangrove-holding nations, the mean per capita income for 1996 is $4,381. This compares to US$17,980 for Australia and US$25,860 for the USA. What Figure 8 shows, even using this crude data, is that according to the World Bank categorisation, for a third of countries with mangroves the average inhabitant's income falls within this lowest category. Whilst significant variations exist between and within countries, given the importance of poverty in the formation of socio-political organisation, this feature is also highly significant (this link is discussed further below and in Chapter 6).

Although sketched out very briefly, these contexts give some introduction to the typical socio-political and economic *status quo* in which most mangrove management is undertaken. The next section examines in more detail the pressure on these systems and their agents to adjust, and to take on board an emergent environmental agenda.

2.2 Socio-politics Moves Centre Stage in the Development Debate

Three different influences, all operating on an international scale (but all manifested in Belize) have brought socio-political issues in developing countries under increasing scrutiny. Firstly, the early 1990s saw the emergence of good governance orthodoxy in aid agencies as a response to the economic crisis afflicting many developing countries (Leftwich 1991, ODI 1992, World Bank 1996). Secondly, there was the internationalisation of environmental concerns, manifested as sustainable development ideology (Brundtland 1987), which was comprehensively taken up by these same agencies through a process of 'greening' (e.g. Spears 1988). Thirdly, internal pressures for better environmental management arose, especially from non-governmental organisations (NGOs) in response to local environmental crises or calls for greater democracy in decision making and resource use (ODI 1992). Fourth was the growing recognition that conservation of wildlife required international co-operation. These trends are now considered in turn, because they generated the impetus behind the arrival of modern environmentalism into Belize's economic and political domains. In so doing, they demanded changes to the *status quo* of resource use.

2.2.1 Good Governance and the New Evangelism of Aid: As described by Leftwich (1993) and others, the early 1990s saw the emergence of a 'new orthodoxy' on good governance by development agencies. Drawing heavily from ODI (1992) this section describes its emergence, reasoning and the changes it demanded. The trend deserves consideration in the context of this thesis because over the research period, the 'good governance' orthodoxy put pressure on Belizean elites through 'conditionalities' in recent aid projects, including two that have directly affected mangroves. This means that the relationship between aid agencies and elites needs to be considered in the analysis of natural resource exploitation. The fact that FPMP just predated this policy change is particularly significant, in the light of the political obstacles it has encountered in trying to promote sustainable resource use. The details related to Belize are covered further on in the thesis, but the background here helps to understand 'good governance' objectives, and is therefore included [1].

ODI (1992) attribute the shift towards good governance, firstly in response to difficulties being encountered by the World Bank, the International Monetary Fund (IMF) and bilateral

[1] Also significant to this research is the fact that this orthodoxy contains echoes of the modernisation theory of Third World development, under which a significant amount of elite research was undertaken. This is returned to later in this chapter.

donors in sustaining reforms under structural adjustment (see Mosley *et al.* 1991). Internal political factors were proving a major obstacle to economic progress, and the conclusion was reached that economic performance could be improved by preventing waste and corruption, and strengthening the overall policy environment. The second factor encouraging donors' interest in politics was the internal movements for political change, particularly in Africa, Central and South America, where the impetus for democratic reform had been gathering since the 1980s. Thirdly, the collapse of Communist regimes in Eastern Europe meant Western governments could promote democracy and pluralism as desirable objectives in their own right, without fear of openly pushing 'Western' values. A notable corollary of these events was also the real threat of the transfer of aid from traditional recipients to Eastern European countries. This rapidly increased donors' leverage and provided a window of opportunity for all except Asian countries, who remained in a position to resist political conditionality more robustly (ODI 1992). As a result of all these trends, Western governments have felt justified to attach political conditions to aid, heralding an era of 'new' conditionalities (*Ibid.*, Leftwich 1993).

The UK government was first to set out its policy stance on political conditionality in June 1990, followed later that month by France. In February 1991, the US Agency for International Development (USAID) followed suit, stating that it would 'direct an increasing amount of funds to those countries that are moving towards economic and political liberalisation' (ODI 1992:1). Germany did the same in October, and in December 1991, the OECD's Development Assistance Committee (DAC) High-level Meeting highlighted democratisation, the respect of human rights and 'good governance' as basic conditions for achieving sustainable development (*Ibid.*). The new conditionality not only encompassed previous dictates on economic policy, but rapidly extended to accountability, openness, transparency in decision-making, and in some cases, the rules governing political competition. This is summed up in the term 'good governance' (*Ibid.*:2). What this did in practical terms was to build on the neo-classical reformist fashion for reducing state intervention in the economy, particularly through the privatisation of para-statal bodies. Most notably in the context of elite influence, this removed many of the opportunities for patronage and corruption that these bodies provided, undermining the clientelist state. By weakening the ruling elite's control over production, it also opened up opportunities for ordinary business people, encouraging the development of an entrepreneurial middle class. Ultimately this group has become sufficiently numerous to push for the re-casting of socio-

political structures more in their favour, undermining the power of the old elite (Lachmann 1990).

As Leftwich (1993) describes, the good governance prescriptions went beyond 'managerial' considerations of fiscal reform and economic streamlining. They also took on the promotion of popular participation in development planning and implementation (e.g. Cernia 1991). On several occasions in the 1980s, grassroots movements emerged in developing countries aimed at tackling environmental degradation. By 1982, Roussopoulos (1993) records over 2,200 environmental NGOs present in developing countries. Friberg and Hettne (1985) highlight these non-elite counter-point movements which 'express the citizen's concern with the exploitation and corruption that typically form part of the functional system' (p. 244). Citizen involvement in non-party politics has become 'the only force that can counter the power of the modern elite' (*Ibid*). In response to these growing indigenous movements, and also to the desire to promote political reform in former communist countries (ODI 1992), the good governance ideology therefore expanded to encompass a democratic agenda. Many aid agencies have, as a consequence, orientated their policy objectives to this end. For example, from 1991 onwards, the ODA made this one of the four basic goals of Britain's aid policy. Clearly, by its combination of policy dictates and institutional reforms, the good governance prescription has had overtly political impacts, with significant implications for those in power (e.g. Ghana and Mexico). Its impact in relation to mangrove use in Belize is considered in Chapter 4.

2.2.2 From Stockholm to Rio - The Emergence of a Socio-political Dimension in Environmental Management: The socio-political components of sustainable development have been receiving increasing attention in the Third World context. By the early 1990s, prescriptions for its implementation increasingly included greater community participation in natural resource management. Not only significant in its own right, this also reinforced the elements of the good governance ideology which was emphasising increased democracy over the same period. The result was that the participatory ideology encompassed by sustainable development became the second influence that thrust environmental concerns into the remit of elites in Belize. This section considers the evolution of this socio-political ideology, in order to identify the forces and agents behind it. Having identified them in general, they are examined in later chapters in the case of mangrove use in Belize.

Over the early 1970s, during the emergence of international environmental concerns (e.g. Club of Rome 1972), the attention given to power and politics by early green protagonists was minimal (e.g. Erhlich and Erhlich 1970, Riddell 1981). However, two prominent resource-related events then strongly underlined the need for socio-political dimensions to the eco-development debate. The 1973 oil crisis showed the significance of international relations in controlling access to resources and the 1968-74 Sudano-Sahelian famine highlighted international terms of trade and domestic politics as powerful influences in an unfolding human tragedy no longer dismissable as simply a 'natural' disaster. As Little and Horowitz (1987) conclude, the failure to predict and 'solve' the drought was perhaps the most significant tragedy that brought about the realisation that science alone was not enough to successfully guide people/environment relations. A resulting shift towards social science in academic analysis and institutional approaches was then able to demonstrate that 'a purely environmental approach to understanding and solving the problem of desertification is inherently inadequate because the causes of 'mismanagement' are social, economic, and above all political' (Horowitz and Salem-Murdock 1987: 96). In the wake of such analysis, it has become conventional wisdom that the most reasonable explanation of all environmental degradation is both ecological *and* social (Messerschmidt 1987).

Despite this assertion, however, in practice only a small proportion of environmental literature or management explicitly confronts socio-political issues. Duetsch for example, lamented in 1977 (p. 359) that in human-environmental literature 'political processes and institutions are rarely mentioned directly and even more rarely analysed in detail. And yet, the substance of politics ... is inescapably implied in almost every eco-social problem'. It was only in response to criticism of this absence of socio-political reference that environmentalists began eventually to encompass some of the issues. This criticism was widespread and came from both the Left and Right. The Marxist critique of environmentalists arose mainly from suspicions of the class implications of environmental development. Enzensberger (1974: 9) for example, sought to expose the claims of social neutrality by early human ecologists as a 'fiction'. Picking up on this point, Harvey (1974: 276) argued that the neo-Malthusian 'Limits to Growth' view invited economic depression to preserve the position of a ruling elite. From the Right of the political spectrum, the entire environmental paradigm has been perceived by many Third World groups as a First World Neo-Imperialist ploy to perpetuate its economic domination and ownership of the means of production (Roy 1985). A less extreme view with the same outcome is that sustainable

development and green politics are both lambasted as post-materialist elitist constructs that can be ill-afforded by developing nations (Friberg and Hettne 1985: 248). Numerous expressions of both views have been made with reference to protected areas, pollution control and resource extraction, with notable examples emanating from Brazil, Indonesia and Malaysia (e.g. Lew and Nor 1988). Clearly, under this diverse critical scrutiny, some of the socio-political implications of environmental ideologies were beginning to be raised.

The difficulty social science faced in trying to penetrate the environmental debate is underlined by the fact that these lessons were not fully learned by the institutions rallying to the environmental cause. The universally circulated 1980 World Conservation Strategy (WCS) of IUCN/UNDP/WWF suffered a barrage of criticism for its lack of socio-political reference. Redclift (1984: 50) for instance, was concerned it did 'not begin to examine the social and political changes that would be necessary to meet conservation goals'. Adams (1990: 50) reflected that 'It seems to assume that people can exist ... outside the influence of inequality, class or the structures of power'. He went on to stress however, that 'It is impossible to understand the relation between development and nature without considering and comprehending political economy' (p. 86). Ultimately, 'without theories about relations between people, capital and state power, sustainable development - and most conservation action - is locked within a limited compass' (p. 200). This failure to explicitly recognise the socio-political dimension to sustainable development tainted international initiatives like the Tropical Forestry Action Plan (TFAP) which was also lambasted for its lack of social reference (e.g. Chee 1980).

It was only in the wake of criticisms of the WCS and the TFAP, that a more realistic and comprehensive treatment of politics, power and distributional issues began to develop in mainstream sustainable development discourse (led by Redclift 1984, Turner 1988, O'Riordan 1988). This has brought the environmental debate forward to the point where socio-political dimensions are frequently acknowledged as a key theme (e.g. Brundtland 1987). As a result, there is now greater acceptance of the conclusion reached by MacNeil (1989) when he describes obstacles to sustainable development as 'mainly social, institutional and political' (p. 105). This position explicitly demands that environmental management puts these components under close scrutiny, bringing with it an emphasis on the role of elites in resource use. In practice, as with the case of the FPMP, this is however, still lamentably lacking.

2.2.3 Greater Prominence of Socio-politics in Development Studies: The last of the three main trends highlighting the importance of socio-political issues in resource use comes from development studies. Since Belize is the focus for significant development efforts, by agencies who have been responding to this greater socio-political emphasis, an appreciation of the origins and agents of this pressure is also useful.

After World War Two, at the time when development assistance institutions were being re-shaped in the wake of de-colonisation, the dominant development philosophy that guided thinking was that science and technology could be used to solve the Third World's development problems. To a degree this is evidently the case, but in trying to account for the uneven success, under-performance or even failure of many development efforts, evidence has repeatedly arisen of elements that are not germane to a technological fix. In their analysis of these situations, anthropologists for example, have shown that whilst analysis of environmental factors is important, an emphasis on social, economic and political dimensions is also essential to identifying development constraints and prescribing corrective actions (Little and Horowitz 1987: 5). Initially, the under-performance of many of these developments was accounted for by the failure to predict or take account of environmental characteristics. This encouraged a belief that by the 'scientific' application of ecology, environmental guidelines for development could be easily devised (e.g. Dasmann *et al.* 1973, Riddell 1981), instigated through the adoption of decision support tools such as Environmental Impact Assessment (EIA). Major lending agencies responded to this reformism at the behest of environmentalists since it was their funds which often supported such projects (Conroy and Litvinoff 1988). However, whilst this has enabled environmental damage to be reduced in many cases, for others it has continued, stirring many to seek out the other influences at work.

In response, social scientists began to first acknowledge and then unpack the socio-political relations operating in the communities and countries at which development efforts were aimed. At first, the new emphasis appeared to be something of an analytical cul-de-sac. As development failures became more evident during the 1970s, it became routine to gloss over the causes in terms of ' lack of political will'. But, as Chambers (1983) points out, 'lack of political will' usually means that the rich and powerful failed to act against their interests.

'Political will' ... is a convenient black box which ... stops short of asking who gains and who loses what, when, where and how' (p.160-161)[2].

With the application of methodologies such as participant observation, progress started to be made (Grimble and Chan 1995). This new socio-political focus found fertile ground at a range of scales, from the operation of state bureaucracies at one level, to political parties, individual politicians, petit-bureaucrats, religious and community leaders. Ultimately, this has led to the recognition that, whilst obstacles to development included natural factors, the main ones are now recognised as socio-political (Horowitz and Painter 1986:3). The response to these findings has routinely led development agencies to include a 'social' component to development or environmental management projects (the FPMP was no different, and had a 'social planner' on its team, whose remit included encouraging community participation in natural resource management). It has also meant that NGOs, the other key agents of development efforts (within Belize as elsewhere), have specifically favoured the less powerful. Typically, assistance has included the organisation of producers' co-operatives, the extension of cheap credit, and assistance to women. All of these can potentially threaten the dominance of local elites by reducing their leverage, and thus control, over their 'constituents'. The role of aid agencies and development NGOs in relation to mangroves in Belize will be considered further in later chapters.

In summary, as these three pressures have evolved, they have raised the profile of socio-political considerations in environmental exploitation, inviting the examination of the response of those in power. The institutions enforcing the tenets of good governance demanded fiscal and structural changes. They also suggested that corruption be eradicated and that democracy be encouraged to engender political stability. It was anticipated that both would lead to an improved environment for economic development. Secondly, under the banner of sustainable development, rational resource use was heavily promoted, along with community participation in resource management. Thirdly, lessons learnt from development studies emphasised support for the powerless as a critical element to achieving development, 'putting the last first' (Chambers 1983). All these related influences coalesced in the early 1990s to make demands on those in power to change the way natural resources were

[2] It is significant for example, that in ODA Logical Frameworks for development projects, the 'risk' column often includes 'political will'. This was the case for the FPMP, as already mentioned.

allocated and exploited. Their response to these trends as they appeared in Belize are closely examined in future chapters, in relation to mangrove use.

In order to proceed with this analysis, it is necessary to identify the special characteristics and mechanisms of the powerful. Before outlining the two contextual frameworks used in analysis, the following section defines the nature of power, the significant characteristics of elites and the political mechanisms through which elite influence is exerted.

2.3 Features of Socio-political Relations Relevant to This Research

The trends above have helped shift the focus in environmental analysis onto those who govern natural resource use. Reflecting this new emphasis, Adams (1990:202) emphasises that 'green development is not about the way the environment is managed, but about who has the power to decide how it is managed'. Such a broad assertion is self-evident, but in order to support an emphasis on individuals as agents of the 'transformation' of resources, there must be forms of influence and mechanisms through which it can be exerted. Therefore, to examine these a set of specific questions has to be answered. What constitutes individual power over resource use, who has this power, and how is it exerted? This next section addresses these issues. It considers the definition of individual power, the characteristics of elite players, and the structures through which they exert influence. Patronage, a system through which the powerful gain the support of constituents in return for some form of reward, is identified as the socio-political system that links the individual, the political structure and resource use. It is considered in some detail, because it is characteristic of many developing countries and forms the basis of mangrove exploitation in Belize, as shall be demonstrated in later chapters.

2.3.1 Power: Power is not an easy term to define and in fact, Dahl (1984), using a phrase not altogether inappropriate for this thesis, goes as far to describe its pursuit as 'a bottomless swamp'. Its precise meaning is complicated not only by its context, but also its different manifestations and scale (e.g. household, community, state). However, most theories of social influence consider it the ability of an agent to exert influence through the possession, or control, of valued resources (Cartwright 1983). These resources, according to Dahl's (1984) broad classification, include opportunities, acts and objects that can be exploited in order to affect the behaviour of another, and may originate from wealth, military capabilities, prestige, skill, information, physical strength, and even the subtle influences of

recognition and affection. This range is extremely useful for this study, given its emphasis on the dynamic and opportunistic way that individuals influence resource use.

Several authors have tried to go beyond these broad definitions of power, with varying degrees of success. For example, Weberian 'socially meaningful relations' break down power into derivatives of economic means, social prestige and legal position. Others originating from the discipline of social anthropology, such as Balandier, Fortes and Evans-Pritchard use power but apply it in a narrowly defined social sphere. Balandier (1970) in *Anthropologie Politique* for example, categorises power in separate categories of political power, kinship power, social stratification power and religious power. A Marxist perspective is different again, emphasising class and control over the means of production as the source of power.

For this research however, the need is for a pragmatic handle on the study of power appropriate to the use of natural resources, the relationship between stakeholders, including elites, and between elites and non-elites. Whilst mindful of the important distinctions of these finer approaches, the definition proposed by Medina (1992) in her socio-political study of agriculture in Belize is well suited to the task. Power is defined as 'people's ability to mobilise either structural or material resources to pursue their interests. In its relational sense, power involves mobilising the agency of others in reaching desired outcomes, either through material relations of domination, or the symbolic manipulation of structural categories to mobilise interest groups' (*Ibid*:11-12). The structures to which Medina refers include institutions, political parties, kinship, or special interest groups (e.g. growers' associations, co-operatives etc.). Material resources encompass land, money, company equity, equipment etc. The application of both types in relation to mangrove use will be returned to in later chapters.

In the meantime, attention must be given to the use of this power at an individual level. The next part of this chapter introduces the concept of elites, describing their background and defining their basic characteristics. Included is a definition of elite status in relation to natural resource use.

2.3.2 What Are Elites? During the first third of this century, a substantial elitist position was articulated in social sciences. Gaetano Mosca, Vilfredo Pareto and Robert Michels were

the principal figures involved, all writing extensive bodies of political theory [3]. Their elitist paradigm suggested that the emergence of elites in society was inevitable, that their ideas and actions were universally the determinant influence on social change. Furthermore, the classic elitist paradigm assumed that elites can act unrestricted by outside forces. Arising as an ideologically opposed reaction to Marxist theory of social change, the deterministic influence of elites was later repudiated (e.g. Cohen 1981, Carter 1974, Field and Higley 1980). More significantly though, the elite position was comprehensively eclipsed by the post-war rise of democratic neo-liberal values and elsewhere by socialist ideology that imposed equality and suppressed individualism (Field and Higley 1980). Only in modernisation theory, a philosophy for achieving Third World development prominent in the 1970s, did elite analysis still persist. Heavily applied in relation to the newly independent nations, it considered that whilst 'structural conditions make development possible, cultural factors (notably the competence of its leaders and entrepreneurs) determine whether the possibility becomes an actuality' (Lipset 1967:3). Under this modernisation banner, political and business elites in particular came under scrutiny because their competence was considered an essential prerequisite for economic development (e.g. Lipset and Solari 1967).

By the end of the 1970s, however, elite emphasis slipped out of fashion as development theorists went in search of other causes of under-development. Consequently, 'the theoretical promise of elitism has been less explored' (*Ibid*:9). Unlike Marxist ideology, which has benefited from re-working to examine environmental issues, the abandonment of the elite emphasis prior to the emergence of mainstream environmental concern, means it has not been re-examined in this context. This thesis attempts to pick up the elite emphasis, and apply its relevant tenets to analysis of mangrove exploitation in Belize. From the outset however, the position that elites have complete control is not accepted. As Field and Higley (1980), Schraeder (1994) and others have argued, elites are at least partially restricted by the need to maintain good relations with other sections of society. They are also influenced by economic, institutional and environmental frameworks in which they are situated. Political ecology has in fact been chosen as the approach for this thesis with this in mind, so that the full range of influences can be considered (see below and Chapter 4).

[3] See Mosca, G. (1939) The Ruling Class. McGraw Hill, New York, USA (ed. A. Livingston, translation by H. D. Kahn). Pareto, V. (1966) Sociological Writings. Praeger, New York, USA (ed. S. Finer, translation by D. Mirfin), and Michels, R. (1962) Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy. Collier Books, New York, USA (trans. E. and C. Paul).

At this point in the discussion, it is important to emphasise the basis of elite status. As defined by Pareto, elites are those in any specialised sector who exercise power (Leach and Mukherjee 1970). Rather more elaborately, Cohen (1981:xvi) describes them 'as a collectivity of persons who occupy commanding positions in some important sphere ...., and who share a variety of interests arising from similarities of training, experience, public duties and way of life.... To promote these interests, they seek corporate organisation' through political parties, professional bodies etc. Both these definitions highlight two important aspects of elites. Firstly, they include individuals and groups, and secondly their precise character relates to the occupation with which they are involved. This emerges from the basic conception of Weber, Michels (1958), Mills (1959) and Higley *et al.* (1990) that elites are rooted in, or associated with, bureaucratic organisation. A useable definition of the level of power that confers elite status must therefore relate to the context in which the elite occurs. Consequently, for the purposes of this thesis, a resource-based definition of elites has been developed. Elite status is therefore defined here as the ability of an individual or group to do one or more of the following:-

- set and implement policy on natural resource use,
- determine the way state-owned natural resources are used,
- effectively control the use of institutional and legal structures that impact natural resource exploitation, or
- repeatedly undertake the exploitation of natural resources on a large scale.

Having established at least basic criteria for elite status in relation to natural resource exploitation, this chapter turns to the elite types identified in the literature and the evidence for their involvement in resource exploitation. After this examination, other important general characteristics of elites are considered.

2.3.3 Elite Types and the Evidence for Their Influence in Natural Resource Exploitation: As already discussed, the great majority of elite research examines elites within the groups defined by occupation. This work is now considered in an attempt to identify and draw together existing evidence of their influence specifically in relation to natural resource use.

Foremost amongst these are *political elites*, and a substantial body of work exists on their characteristics, operation and composition (e.g. Marvick 1961, Lasswell 1968, Parry 1969, Zuckerman 1977). The great majority of this analysis has focused on developed countries, but nonetheless certain findings are generally applicable. Firstly though, there is a useful distinction to be made, between the minority group which rules and takes part in decision-making, and a larger group from which these politicians are drawn and into which they return, if out of office. Scholars such as Bottomore (1964) and Mosca (1939) differ in precise terminology ascribed to each, but the terms used in this thesis follow Bernstorff's reasoning, in that the decision-makers represent the *ruling elite* and the others with significant, but not ultimate power, are the broader *political elite*. The ruling elite negotiate over international political relations, establish conditions of trade, take a major role in setting development ideology and priorities, and have control of the apparatus of government and state owned resources. It is inevitable therefore that they have many potential avenues of influence over natural resource use.

Despite this, the volume of work that looks explicitly at the role of either ruling or political elites in Third World natural resource issues is surprisingly scarce. From the work that has been carried out, one clear theme that does emerge is the ruling elite's role in framing development ideology (e.g. Little and Horowitz 1987, and Stonich 1993). This is vital, because ideology directs so much policy formulation and implementation effort. On her work on deforestation in Honduras, Susan Stonich demonstrates, for example, that the ensuing environmental crisis was 'to a great degree caused by unsustainable, elite-orientated development strategies' (Stonich 1993: 3). It instigated a development path which promoted rapid accumulation of capital at the expense of the environment, and simultaneously fostered the fiscal and other structures to partition these benefits amongst themselves and their elite supporters. Other aspects of the ideology of the ruling elite that have had significant environmental impacts are related to national security. This has been used as justification for the expropriation of forest lands in particular, from indigenous peoples into the control of the ruling elite. Examples can be found in northern Thailand (Chan 1995), and Guatemala where the *junta* have continually sought to gain control of the Péten.

The second group, and one also often involved in government, is the *military elite*. Despite its often oppressive role in the history of most Latin American and some Caribbean countries, the development of an indigenous military elite in Belize has been delayed

because of the British military presence up to 1994. Its absence to date means that it will not be considered further [4].

The third major elite group are *bureaucrats*. The influence of senior bureaucrats has come under repeated scrutiny, for example the role of Creole senior civil servants in Sierra Leone (Carter 1974) and higher public servants in Nigeria (Nwankwo 1980). Again, little, if any, of this research specifically examines their role in natural resource issues. Research instead has focused on their generic characteristics (attitudes, influence on corruption, etc.). Nonetheless, the resulting evidence suggests that 'In almost all political systems, the senior bureaucrats not only advise ministers but also initiate and carry out a great deal of public policy' (Cohen 1981:59). Other researchers have gone beyond the policy role of bureaucratic elites, and identified a strongly political dimension to their operations. 'Everywhere and inevitably the administrative process is also part of the political process; administration is always political as well as executive, at least at the upper layers of administrative life' (Miliband 1973:47). Again, if resource exploitation is to be understood, the socio-political influences of the bureaucratic elite must also be considered. As will be shown in later chapters, both types of influence appear in Belize.

Work on the fourth group of elites identified in the literature does, by contrast, directly relate to resource exploitation, and is therefore considered in more detail. The role of *technical elites* has been a significant part of development discourse (e.g. Chambers 1983), focusing in particular on foreign consultants and planners. As well as these ubiquitous and influential actors in development projects around the Third World (Hollis 1989, Adams 1990, Stone 1980, Chambers 1983), indigenous (often foreign-trained) technocrats have been cast as an elite group, of predominantly urban, male-dominated science modernists with associated ideologies, perspectives and priorities. A post-modern re-evaluation of their role has revealed much of interest for this thesis. As Lake (1993: 404) describes, there has been a long retreat from the positivist assumptions of development planning, of 'analytical and technical objectivity, political neutrality, subject-object dualism and of a world discernible in terms of lawful regularities'. Broad and Cavanagh (1993) provide a useful

[4] Guatemala's military *junta* laid claim to Belize, and to counter this threat, British troops were kept in Belize until 1994. Although further consideration is outside the scope of this thesis, it is worth noting that two natural resource issues have featured in the propaganda 'war' between Belize and Guatemala's political elites. Firstly, the incursion of Guatemalan farmers into Belizean protected areas, followed by their subsequent re-patriation, was a highly contentious issue that was fully exploited by the Guatemalan government to foster nationalist fervour and divert attention away from Guatemala's domestic problems. Secondly, the jurisdiction over maritime areas along their Caribbean border was the subject of long negotiations between the two countries, after continued illegal fishing by Guatemalan trawlers in Belizean waters. By precipitating a split in one of Belize's political parties, this particular issue was influential in the fall of the governing party in 1993.

example, identifying the processes by which Filipino technocrats in the Marcos regime were selected to serve the dominant ideological priorities of his political elite. Little and Horowitz (1987) also found the idea of a technocratic elite illuminating when applied to understanding the developmentalist ideologies driving Amazonian deforestation. Technocrats and their political sponsors appeared pre-disposed to support developmentalist ideologies (more provocatively referred to as 'growth-mania'). Nowhere is this better illustrated than with large scale infrastructure projects, but as these have been absent from Belize, this will not be considered further [5].

Others, however, suggest that technocrats have an insignificant marginalised role in guiding the development process, and do not have elite status. Research shows that this arises from their subordinate relationship to political and business elites, and the fact that in the eyes of these groups, technocrats' work, values and institutions are held in low esteem (Cochran 1959, Lipset 1967). Hecht and Cockburn (1989:205) use the regional example of Amazonia to demonstrate the politically-motivated forces which doom such attempts at rational land use planning to failure. They describe how 'even with the best plans, the forces loose in the region simply gallop over the lines drawn in Brasilia' because, in respect of land allocation, whilst officials recognise the small plots they allocate are not viable, their concern is primarily political, not ecological (Horowitz and Painter 1986:48).

On balance, analysis of the status of technocrats shows that their role is dependent on the context in which they operate, specifically, the type of relationship they enjoy as servants of political and bureaucratic elites. When ideologically aligned, their status can reach that of an elite. Alternatively, if they pursue an ideology that does not fit with that of local dominant groups, they can be easily and effectively marginalised by the ruling elite. This then is one type of relationship that will receive analysis in this study, because it is relevant to planning in Belize City and other mangrove areas of Belize (see Chapter 6 and 7).

[5] The dominant thinking on promotion of economic development in the Third World in the 1960s and early 1970s revolved around Rostow's 'take off' model. Central to this was an approach to mimic the technical and industrialisation processes of the north, requiring *inter alia* the application of technology and putting in place essential infrastructure to facilitate the development process. This promoted a 'mega-project mentality' (Goldsmith and Hildyard 1984) that encouraged grandiose infrastructure projects that proceeded regardless of economic viability, or social, or environmental consequences (see Schmink and Wood 1987) and gave many technocrats elite status. The case of the Indonesian Transmigration Programme is one well-documented case affecting wetlands, that has a range of evidence showing both politically and elite orientated facets of the project design, implementation and post evaluation.

The fifth group is an *entrepreneurial elite*, and there has been considerable analysis of their role in the development process, much of it relevant to resource use. In particular, studies were carried out to elicit distinctive economic behaviour and their influence on economic development policy (e.g. Cochran 1959, Lauterbach 1962, 1965 Cardoso 1967, Scott 1967). A great deal of quantitative evidence was uncovered of traits which, although not tested in relation to environmental attitudes at the time, can and should be applied in this light now [6]. Examples include mistrust of government, the emphasis on personal freedom, the protection of ownership rights, the reliance on personal relations in business and politics, including in the Latin American context, and mutual trust shared amongst *hombres de confianza* (Scott 1967:122). It is not difficult to see that the implications of these specific mentalities, values and ideologies and resulting modes of action have considerable implications for the enforcement of environmental regulations. Evidence presented in later chapters will certainly reflect many of these characteristics in relation to mangrove exploitation .

The *legal elite* is one further important elite group that has occasionally been referred to in the Third World context. However, analysis has been relatively scarce, perhaps partly because, as a strongly hierarchical profession, the notion of elite members is relatively clear. Of the analysis of those elites that has been carried out, none directly deals with their role in environmental considerations. For this research context, the legal elite are important, and their activities in relation to mangrove alteration will therefore be returned to in later chapters.

Finally, of considerable note is the *landed elite*. Historically, this group has been extremely significant in the economic, political and social life of Latin American countries, including Belize (see Bolland and Shoman 1977). Only recently has their dominance of most national oligarchies declined, as entrepreneurial and other elites have arisen to claim a share of power. The role of the landed elite is related directly to natural resource use, because their control of the more fertile land often forces the poor into marginal areas (Chambers 1988). Once sidelined in this way, the fragility of the environments in which the poor find themselves means that their cultivation or other forms of exploitation generally leads to rapid degradation (e.g. King *et al.* 1993). In this sense, the landed elite have frequently precipitated environmental degradation. Their other major role stems from the use of land in

[6] Echoes of many of these characteristics occur in the analysis of Amazonian deforestation by Hecht and Cockburn (1989) but they fail to make the link with this potentially reinforcing body of evidence.

their possession. Depending on the crop, it may be heavily exploited for the production of cash crops for export. The production of cotton on Guatemala's Pacific coast is one example where pesticide pollution has severely damaged mangroves (Leonard 1987:142). Alternatively, leaving land undeveloped, they may participate in land speculation, inadvertently providing a form of *de facto* reservation. Alternatively, the reservation of land may be a direct goal of some landed elites, and whilst long established in Africa, there is an emerging trend in the Americas of conservation organisations becoming major landowners. These too may be said to demonstrate elite status. All these types of resource use patterns by the landed elite are evident in Belize, and will therefore be considered in relation to mangroves in subsequent chapters.

2.3.4 Elite Involvement in Mangrove Exploitation: Specific consideration of elites in relation to mangroves, is relatively rare in the literature, and significant references are mainly restricted to two topics [7]. The first is their traditional role in the allocation of rights over mangroves, either for ownership or for harvesting their resources. However, through the widespread expropriation of the inter-tidal zone by the state, and from other socio-political, economic and cultural changes, in most mangrove areas traditional indigenous frameworks for controlling access to common property resources have broken down (e.g. Johannes 1978). Traditional leaders have been replaced by new elites, whose roles and modes of operation are significantly different in driving environmental degradation, as already described. The activity often precipitating, or at least taking advantage of, these changes is aquaculture, which is the second topic attracting attention in the literature.

By far the greatest focus on elites for contemporary mangrove exploitation relates to aquaculture (e.g. Bailey 1988, Primavera 1991, Keene Meltzoff and LiPuma 1986). Although an ancient form of mangrove utilisation, on a small scale and low intensity basis, recent changes in production technology and consumption have led to the widespread introduction of intensive and semi-intensive cultivation of shrimp (*Penaeid* spp.). The ponds used in this new aquaculture industry have frequently been located in mangrove areas, requiring the clearance and conversion of large tracts. Spalding *et al.* (1997) for example, estimate that over 6% of the world's original mangrove area has been converted for this

[7] This is also the case with wetlands in general. Hollis (1989:9) provides one of the few exceptions, noting that 'in virtually all wetland systems there are particularly powerful individuals and there are often influential committees or informal groups of people. In many cases these people and groups are not readily apparent and in some situations the most influential people never appear on reports and studies'.

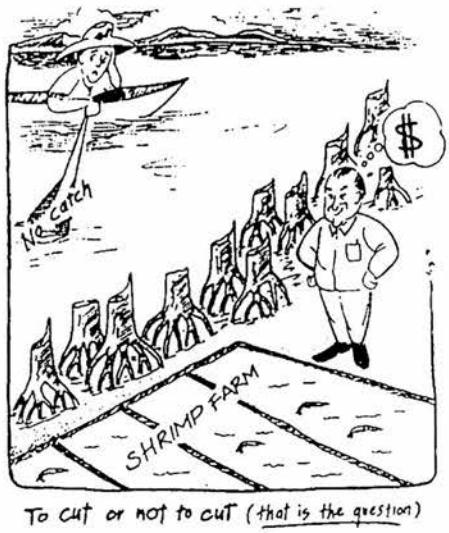
purpose. Particular countries have been heavily exploited. In Ecuador for example, approximately one half of its mangroves has been cleared in the last 20 years, mainly for the largely illegal construction of shrimp ponds, whose output is destined for Northern markets (Cherrez 1997).

With its capital-intensive nature, skilled managerial requirements, potentially large rapid profits and orientation towards production for export, this modern form of aquaculture has attracted a different set of stakeholders to those who previously inhabited or used these mangroves (Keene Meltzoff and LiPuma 1986). As Bailey (1988:37) identified, 'Local elites have the advantages of education and wealth which provide access to the knowledge and capital necessary to successfully adopt new production technologies. Of equal importance, these same elites are politically influential and have access to institutional resources (e.g. credit, government subsidies, permits etc.) unavailable to non-elites. These political connections are particularly important to understanding the dynamics of shrimp mariculture development' [8]. This scenario closely matches the elite involvement in this industry in Honduras reported by Stonich (1993).

The environmental impacts associated with aquaculture include direct loss of mangrove forest products, reduction in natural fisheries reproduction, water pollution and the introduction of exotic species (Pillay 1992). Indirectly, the expropriation of formerly common property resources for aquacultural use by external elites or local petit-bourgeois, has led to the overuse of marginal resources by former users who have been disenfranchised in the process. As a result, and because of the environmental impacts, a conflict of interest has frequently arisen between these new stakeholders and local traditional mangrove users (Turner 1991). 'In some cases, members of a local elite simply stake a personal claim over resources that have been used by local residents without bothering to obtain a permit' (Bailey 1988:37). In Java, for example, local elites have made sure they capture the benefits of aquaculture by gradually altering tenancy relationships in their own favour (Hannig 1986). Typically, modern aquaculture has generated significant benefits for only a small number of urban entrepreneurs, while a large number of rural poor have lost income from the natural shrimp fishery (*Ibid.* p. 60, Shiva 1997) (Figure 9).

[8] This ability of elites to quickly adopt innovations, many of which have adverse environmental impacts, has been highlighted in the work of Hannig (1986) as well as Bailey (1988). This is in relation to the 'Blue Revolution'. Interestingly, this echoes a significant body of work about the role of elites in the take-up of Green Revolution technology, carried out in the 1960s and 1970s (e.g. Rogers 1962).

Figure 9 Cartoon showing impacts and trade-offs from aquaculture



Source: Unknown

Attention has been given to these conflicts in several countries, in the media, in academia and on the internet (see, for example, the Mangrove Action Project's web site at http://www.earthisland.org/ei/map/map.html). The case of the Philippines features highly in this analysis (principally through the work of Primavera and Anderson), and highlights the elite status of aquaculture developers. Anderson (1987: 262) comments, for example, that 'Tremendous political pressure has been mounted by elite-dominated fishpond associations to release the remaining mangrove areas' for conversion to ponds. The role of elites in circumventing procedures for aquaculture control has also been frequently highlighted. In the Philippines, Primavera (1994:49) describes 'corruption at many levels of bureaucracy', avoiding prosecution or circumventing environmental restrictions. Further evidence of this type of role for elites comes from India (Shiva 1997), Honduras (Lopez 1997) and Ecuador (Cherrez 1997). Typically, in these situations, evidence shows an unwillingness or inability of authorities, including environmental authorities, to enforce the existing protection laws or prosecute those who have violated them. The implication is that the aquaculture developers are 'above the law', a useful indicator that they have elite status. The conclusion is inescapable, and the role of elites in forcing the expansion of aquaculture is clear. 'The negative consequences of shrimp mariculture development are not the blind chances of a cruel economic fate, but rather are the direct result of structural inequalities of wealth and power' (Bailey 1988:39).

In addition to the research in which elites have been specifically examined, reference should also be made to analyses that considers their role in all but name. Walters (1994), in his examination of mangrove restoration efforts in Bais Bay in the Philippines, highlights the importance of getting the support of the local political leaders for re-planting programmes. He underlines 'the importance of establishing clear, open communication with local political leaders from the outset' or risk interference with project implementation (Walters in press). In this particular case, the local Mayor took the project 'under his wing' and therefore was able to access the resources of status, publicity and finance associated with it. Clearly, here is a project in which the role of elites was clearly recognised and engaged.

Having established the types of elites and highlighted existing evidence for their involvement in resource exploitation, there now follows an assessment of other general characteristics of elite groups.

The first is a shared respect of status between elite groups. As Mills (1959:225) observed 'there is mutual recognition among the elite that the other elites count; in one way or another they are important people to each other'. Because of this, he argued that elites strive to harmonise their different interests where possible in order to maintain rule over the mass of the people. Their distinct organisational structures for their particular power base, means that several elites can co-exist in a single historical era because each extracts different resources for its own benefit (Lachmann 1990). This mutual coexistence is partly explained by a second characteristic, that individuals can and frequently do belong to more than one elite group, or at least maintain connections between them through a range of different linkages (e.g. multiple directorships, professional and occupational associations, overlapping cliques of friends, family schooling, and club membership). A commonly encountered example of simultaneous membership of two elites is the senior lawyer who is also a politician. In this case (important in Belize), the individual has at his disposal two sets of structures and resources to manipulate in order to achieve his chosen objectives. Also in this case, it ensures a continuity of elite status, for during the periods out of office, such individuals still retain their position in their remaining domain.

The third characteristic of elites is the dynamism of their group membership. In the case of Africa, for example, when trying to categorise elites Bretton (1973: 161) stressed that 'although (elite) groups are not meant to be clearly delineated one from the other, they are

substantive, socially live and assertive; they are themselves instruments of power, capable of merger with others or of partial metamorphosis'. Researchers have particularly examined the shifting alliances within ruling and political elites that are undertaken to maximise the chance of retaining power (e.g. Parry 1969, Putnam 1976 and Carter 1974). Lachmann (1990) takes it further to put forward an 'elite conflict model hypothesis'. It posits that when multiple elites exist, their interests are directed against challenges from competing elites as well as non-elites. Furthermore, not all elites hold an equal degree of power, creating more instability. Certainly, the dynamism in elite relations makes it essential that environmentalists are alive to changing alliances. The 'stakeholder shifts' that suddenly develop in the wake of such changes, most dramatically after a change of government, alter the composition of decision makers and therefore the decision-making process. These episodes in Belize have proved highly significant for patterns of resource exploitation over the study period and will also be considered in detail in following chapters.

The fourth feature of elites is that they are historically positioned and therefore need to be considered in an evolutionary framework. Bretton (1973) noted in Africa, for example, elite separation, agenda differentiation and competition as accompanying features of the state development and maturity. This echoes the work by Mills (1956), who highlighted the increasing capacity of elites to pursue their interests as the bureaucracy of state expanded. This theme has been continued by Field and Higley (1980) and Higley *et al.* (1990), who go as far as devising a generic phaseology of elite types which spans the pre-colonial to independence transition. Integral to this is a recognition of the 'complex national and international circumstances in which each kind of elite is historically embedded' (p. 41). Carter (1974) also notes the importance of antecedent governmental and administrative institutions for setting the arenas for much of the activity of ruling, political, bureaucratic and legal elites in particular. Establishing a historical perspective on the developing role of elites and the structures in which they operate is therefore an important part of any elite analysis, a view which suits the historical emphasis of political ecology (see Section 2.4).

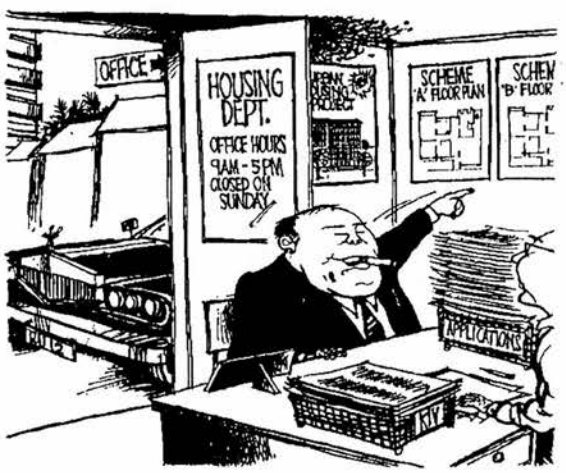
Having considered at some length these significant features of elites and the evidence for their influence in resource use, this chapter moves on to examine the detailed relationships which govern socio-political characteristics of developing countries' political systems. This includes consideration of the particularistic and universalistic functions of those in government, the significance of intra-elite relationships, and patronage, a form of socio-

political organisation prevalent in Third World politics. After this, in the chapter's concluding section, political ecology and stakeholder analysis will be examined to establish their suitability for assessing the role of elites.

2.3.5 The Socio-political Basis for Elite Influence: Three types of socio-political characteristics are central to understanding the behaviour of elites. The first concerns the duality in serving their own personal '*particularistic*' objectives plus those of society as a whole (i.e. the '*universalistic*'). The secondly involves the relationships *between different elites*. The third is the interaction *between elites and non-elites*.

'Me' or 'Us': Durkheim (1986) argued that nearly all social groups have both particularistic and universalistic functions, and elite groups are no exception. Their distinguishing feature is the greater than normal level of power available to pursue both these roles. In many cases, universal and particular goals may overlap, so that both can be readily and legitimately pursued. In others, attempting to balance the public interest with their own can be a source of conflict that individuals have to resolve. What is clear is that within the Third World context, those in power have generally pursued strongly particularistic objectives, aimed at accumulating financial wealth and portfolios of valuable assets. There are several such notorious cases (e.g. Kenya, Indonesia and the Philippines). Other particularistic objectives involve the allocation of resources to family and friends, a widespread phenomenon and one encapsulated from an Indian example in Figure 10.

Figure 10 A cartoon portraying the particularistic agenda of a housing official

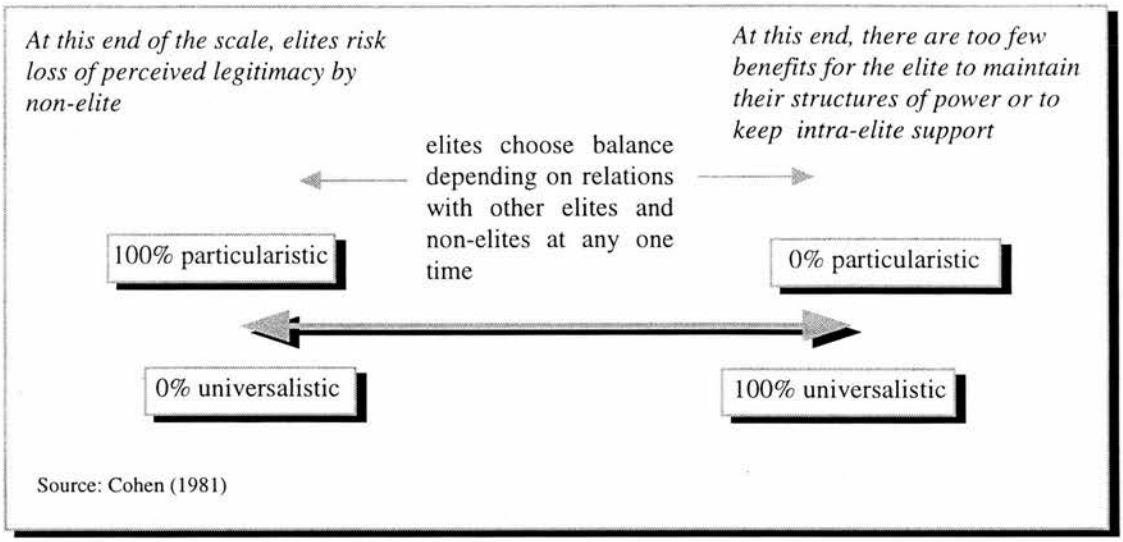


"I'll need a few of these low-income units. At least four of my mistresses have low incomes."

Source: Sarin (1983)

The problem these elites encounter is that occasionally they are forced to seek legitimacy for their high status by assuming universalistic functions (Cohen 1981). The interplay of these two sets of objectives is illustrated in Figure 11, showing the range of options that elite individuals can take at any one time.

Figure 11 Representation of the trade-offs between particularistic and universalistic functions of elites



The balance between universal and particular goals is complex, especially for elites in government who supposedly have the greatest responsibility for promoting society's well-being but are in an extremely good position to pursue their own agendas. Variations over time are common, and both types of function may be carried out simultaneously or on different occasions, as considered desirable by the elite in question. Cohen (1981) notes that the balance may vary at different phases in the career path of an elite individual. Clearly, they vary in relation to events like elections, and also others such as natural disasters (e.g. Blaikie *et al.* 1994). The emphasis on one or the other may also vary spatially, between urban and rural areas for example, or by ethnic composition of different areas. Elites may also espouse universalistic rhetoric, for example on 'nation building', in order to smoke screen their own actions which advance their material well-being (Bretton 1973). A typical example is for developing countries' leaders to cast conservation as an 'eco-imperialist ideology', invoking national sovereignty and patriotism to resist these unwelcome outside influences (e.g. Cummings 1990). Meanwhile, often against the will of local residents, the same governing leaders are directly involved in resource exploitation that would be restricted by such environmental measures (e.g. Duffy 1996). The resulting tensions and

conflicts that particularistic and universalistic objectives cause elites are critical in determining the way they influence resource use.

Intra-elite relationships: The next important facet to elite operation is intra-elite relationships. These are maintained through a variety of formal and informal connections (e.g. mutual favours, business fora, family ties, friendships, joint business ventures), and are extremely significant to elite functioning, as several authors have noted. Carter (1974) for example, highlights how the ruling elite can efficiently 'capture' a larger 'client-base' by securing the support of individual power holders who 'represent' larger constituencies. As he observes 'when politicians require electoral support they mobilise it indirectly through a network of horizontal alliances with influential leaders rather than directly' (p. 174). A resource-related example here would be a politician securing the support of a large group of fishermen by getting the allegiance of the Chairman of their fishing cooperative. In another facet of intra-elite co-operation, access can be granted to different forms of resources that may be exchanged in return for support. This type of mutually beneficial intra-elite relationship, Lachmann (1990:401) argues, is the most important activity for ensuring continued elite status. 'Each elite's capacity to pursue its interests derives *primarily* from the structure of relations among the various co-existing elites and *only secondarily* from subordinate classes' (emphasis added).

This does not, however, mean that conflicts between elites do not exist, because for many types they do. By far the greatest significance in relation to this research is conflict associated with party-political divisions. As shall be seen in later chapters, in almost every case, each elite (e.g. legal, bureaucratic) is divided into two sub-groups, sharing identical characteristics but each aligned to one of the two political parties. In comparison to such political divisions elsewhere (e.g. in India), those in the Caribbean have remained relatively stable and persistent. Therefore, given their resulting pervasive presence, the role of party politics in elite behaviour is put under close scrutiny in future chapters.

Patronage: Whereas intra-elite relations have been characterised as 'horizontal', the links between elites and non-elites are more vertical (Carter 1974). These relations have received far greater analysis than intra-elite, probably because there are more public manifestations of their cultivation, a political rally being one example. The organisation of these linkages is through patronage (also known as 'machine politics' or clientelism). Patronage has been

held up as one basic framework of resource distribution at an individual level in developing countries and has also been generalised into an explanatory framework applicable to Third World politics (e.g. Bratton (1978:19) for Africa). What it entails is 'personalised relationships between actors, or sets of actors, commanding unequal wealth, status or influence, based on conditional loyalties and involving mutually beneficial transactions' (Lemarchand and Legg 1972:151). Transactions between patrons and followers are assumed to be reciprocal in that a patron offers material or symbolic rewards and opportunities for social mobility in return for political support at the polls and elsewhere. This kind of patronage relationship in resource distribution is pervasive in underdeveloped peasant societies characterised by extreme scarcity (Powell 1970, Carter 1974). Sandbrook (1972) also attributes it to situations where class consciousness is weak. Individuals see that instead of class conflict, they may most quickly improve their situation by means of individual action through the mechanisms of patron clientship. The basis of these vertical ties between leader and follower may be based on kinship, religious, ethnic or other grounds, or on a combination of these (Firth 1957). Ultimately though, 'most vertical .... alliances are based on economic relations in which the political class controls valuable resources' (Carter 1974:121). Therefore, 'in general, an elite leader's following consists of politically weak economic dependents' (p. 127). This point is important, given the low mean per capita incomes of mangrove countries highlighted earlier in this chapter.

Patronage in African and Asian contexts has been interpreted as a residue of pre-colonial forms of social interaction (see for example Riggs 1970). In Latin America and the Caribbean, there were no antecedent indigenous forms of organisation left intact by the time modern states were formed. Therefore, the systems of political relationships that now prevail, including patronage, have arisen through colonialism and subsequent independence.

Patronage, as a system of socio-political interaction, has been studied particularly in Africa and Asia. Its rise has been attributed to the responses of new leadership groups to expanded opportunities for acquisition of resources up to and since de-colonisation. Characteristically, 'party politicians distribute public jobs and special favours .... (and) seek to turn public institutions and public resources to their own ends' (Weingrod 1990:379). As a pattern of resource distribution, patronage is marked by vertical ties between leaders and followers and the occasional access of all members of successful factions to central resources. For members of the elite, patronage is a major source of power, and they therefore compete to

provide sufficient patronage to their supporters to maintain their allegiance and to avoid their 'capture' by competing elites.

An economic perspective: Given the emphasis in this research on a pluralist explanation of environmental exploitation, it would be inappropriate to proceed further without some reference to the economic influences on resource use. Having considered up to this point the socio-political factors that are significant to natural resource use, this section examines the economic influences at work. The critical point for this research is the degree to which these economic forces 'dictate' the behaviour of elites, i.e. is elite behaviour a reflection of the economic system in which it exists, or do other factors affect its behaviour? This is a question of structure versus human agency.

In explaining the poor performance of environmental management projects, Schmink and Wood (1987:38) emphasise the role of economic counter-forces. They emphasise that 'the goals of environmental policy (conservation and long-term sustainability) are fundamentally at odds with the goals of expanded production and short-term accumulation' inherent in capitalist economies (i.e., for mangroves, all countries except Cuba, China and Viet Nam). They continue that 'in the socio-economic and political context within which resource management projects must be carried out, the principle of private profit and expanded production far outweighs that of biophysical sustainability and environmental conservation .... It is hardly surprising that the goals of ecologically sound projects premised on assumptions of sustainability are consistently subverted by the mechanics of a social system based on the laws of accumulation' (p. 39). To account for this subversion, they argue that an understanding of the 'society's prevailing form of economic production and class structure is required, along with an awareness of ways the diverse economic groups battle for ideological and policy advantage within the state apparatus. Only once achieved, can effective resource management projects and strategies to carry them out be designed' (Schmink and Wood 1987:39).

However, although important, the over-riding dominance of economic thesis for Third World environmental degradation is rejected, as explained in Section 1.1. Whilst elites do respond to economic motivation in part, Schmink and Wood go on to argue that they also react to a wide variety of other influences at the same time. Any form of economic determinism is therefore rejected because it limits the reasoning behind elite behaviour and

relationships. In the following chapters therefore, a major task is to identify where this balance lies, between non-economic influences on elites one hand, and the macro and micro-economic factors to which they respond on the other.

In summary, this section has isolated the pertinent socio-political and economic interests through which elites are linked to natural resource use in developing countries. Although explicit analysis of their influence in this context is relatively rare in the literature, significant strands of evidence have nonetheless, been gathered, suggesting that they do have a significant role in shaping exploitation. However, the range of contexts in which this relationship has been tested is far from complete, and the methodological approaches are inconsistent. Therefore, the analysis in the following chapters aims to contribute to the understanding of elite influence by examining their impact on mangroves, using political ecology and stakeholder analysis to frame the research. The details of this approaches are now considered.

2.4 Political Ecology: Its Characteristics and Suitability for Elite Research

Following the growing recognition of the socio-political dimension to environmental issues, calls have been made for a re-orientation of Third World environmental analysis to take them into account (e.g. Adams 1990, Bryant 1992, Hjort 1982). One potentially significant response has been the emergence of an approach to environmental analysis known as 'political ecology'. It aims to 'understand the political sources, conditions and ramifications of environmental change' (Bryant 1992: 28), and is therefore of potential value to this thesis. In the penultimate section of this chapter, the characteristics of political ecology and the insights from its application to Third World environmental exploitation are considered. The objective is twofold, firstly to demonstrate its suitability for this thesis, and secondly to delimit the boundaries of analysis that such an approach requires.

2.4.1 Political Ecology - Scope, Purpose and Definition: Political ecology is a pluralist approach to environmental analysis that integrates several long-established lines of research, specifically political science, sociology, anthropology, economics, geography, development studies, human ecology and ecology. It is this broad pedigree that gives it potentially useful analytical power. By encompassing the scope for social, political and environmental influences, it mirrors the full range of forces that in reality affect the way people use their

environment. It was precisely this lack of breadth that frequently inhibited the correct diagnosis of the cause of environmental degradation in developing countries (Adams 1990, Redclift 1984).

Political ecology differs from human ecology, to which it is most strongly related, by its detailed attention to the inter-relationships between the political-economic and human ecological dimensions of resource use. According to Bassett (1988:455) for example, human ecology has devoted insufficient attention to the political dimension of resource access and allocation.

Political ecology also draws heavily from political economy, the study of the distributional conflicts of economics. This bodes well for this research with its focus on elites, because they are the people who benefit from a skewed distribution of power and resources. The distinguishing aspect between political economy and political ecology however, is the latter's consideration of environmental influences (*Ibid.*). As Grossman (1993: 347) stresses, the 'political-ecological perspective highlights not only the impact of political-economic relationships on resource-use patterns but also the significance of environmental variables and how their interaction with political-economic forces influence human-environment relationships'.

Moving from its scope to its definition, Blaikie and Brookfield (1987b:17) give political ecology a working remit as 'the combined concerns of ecology and a broadly defined political economy'. With more precision, Martinez-Alier (1995) defines political ecology as the study of the social, spatial and temporal inequalities in the human use of environmental resources, and in the inequalities in exposure to the burdens of pollution. Schmink and Wood (1987:39) focus on how economic and political processes determine the way natural resources are utilised. They seek to establish a political ecology of resource use that incorporates the concepts of surplus, social class, the state, and ideology, arguing that earlier approaches to environmental management were too narrow, excluding political variables.

From this background and these definitions, political ecology is an appropriate approach from which to draw inspiration for the investigation of the role of powerful individuals in the exploitation of mangroves, a resource which has a very specific set of environmental characteristics.

The one remaining aspect yet to be considered in this introduction to the purpose, scope and definition of political ecology, is its suitability for analysing the role of individuals in environmental change. As reflected in the definition offered up by Schmink and Wood (1987) and Blaikie and Brookfield (1987), the majority of political ecology has concentrated on the joint operation of international capitalism through the state as the key force of environmental exploitation. Stonich (1993:13) accepts this macro set of influences, arguing that 'the ecological crisis in Central America cannot be understood in isolation from the structural processes that are determining the way resources are used'. However, in her Honduran work, Stonich gives greater attention to the influence of local actors, to augment this structural emphasis, in particular 'the differential consequences of exterior pressures on varying classes and interest groups and the ways in which human agency and local level initiatives influence the broader political economy' (p.26). Drawing from the work of John Bennett (1990), this fuller political ecology allows flexible analysis of localised micro-scale decision making, and macro-level institutions, such as markets and government agencies. It invites the examination of political and economic actors, and is capable of reflecting their highly contingent and dynamic role. So although rarely tested to date in this way, political ecology has the potential to accommodate an individual scale analysis. This should especially be the case for elites, who by definition, are significant players in the class and state structures on which political ecology has more usually been focused. Such breadth of scale is equally well encompassed by SA, and the two together promise to yield a potentially powerful approach to analysis.

With the basic aspects of the political ecology approach introduced, the next section examines its application in Third World environmental discourse. Essentially, it poses the question 'what insights has the political ecology approach produced that are pertinent to the research of elite influence in mangrove exploitation in Belize?'

2.4.2 Key Elements to Political Ecology: To identify the key elements of political ecology requires a search of relevant literature to be widely cast. The term 'political ecology' was only coined in the early-1980s (Grossman 1993) [9] and references to it in the literature are still relatively rare (Hjort 1982, Bennett 1984, Blaikie and Brookfield 1987a, Hecht 1985,

[9] The term political ecology has also been used in reference to what is now called 'green politics' (e.g. Enzensberger 1974). Its analysis, whilst related, is distinguished by its restricted focus on politics. It is therefore more properly seen as a topic of political science, albeit one which can contribute to the broader political ecology used here.

Little and Horowitz 1987, Schmink and Wood 1987, Lopez 1987, Peluso 1992, Stonich 1993, Hershkovitz 1993, Broad and Cavanagh 1993). However, as Bassett (1988) and Grossman (1993) rightly suggest, to give a true indication of its use to date, the boundaries of the search also need to encompass work which displays the characteristics of political ecology but not its actual name (e.g. Bennett 1976:7, Yapa 1979, Franke and Chasin 1980, Ellen 1982:83, Watts 1983) [10].

The first consistent theme of political ecology is its emphasis on political structures. By far the most common is the role of the state in determining resource exploitation, directly through state-sponsored projects or indirectly through economic and/or fiscal policy. State influence has been shown to operate in diverse settings, including tropical deforestation (Hecht and Cockburn 1989, Bunker 1985a and Hall 1989), energy development (Cummings 1990, Horowitz and Salem-Murdock 1987), water resource provision (Gonzales 1972), and transmigration (Budiarjo 1986). Out of these, pro-development state ideologies, in particular, have been criticised for promoting certain types of resource exploitation regardless of their environmental or social cost (e.g. McDonough 1981). Secondly, the managerial capabilities of governments have been brought into question, specifically the effectiveness (or otherwise) with which the apparatus for national affairs (ministries, judiciary, military, civil service etc.) is applied to development. The third component receiving attention is the way state structures are used to promote specific particularistic and partisan objectives. On each front, analysis of mangrove exploitation in this thesis clearly needs to include the state's involvement.

Whilst dominant, the state is however, only one structure through which power relations are mediated. At the broadest level, there are also the structures which mediate international relations and activities. These include trade agreements (e.g. the Lomé Convention), producer bodies (e.g. the International Timber Trade Organisation), aid agencies, membership of international fora (e.g. the United Nations), and conventions (e.g. Convention in Trade in Endangered Species). This latter category is one that has included a proliferation of environmental initiatives. By 1993, there were 250 international agreements concerning environmental issues, of which 75% had come into being since 1960 (Roussopoulos 1993). As well as these environmental measures, many of the other international agencies have taken on environmental remits, most notably the greening of aid

[10] What Yapa (1979) calls 'ecopolitical economy' for example, and Grossman (1984) 'the cultural ecology of economic development' have many similarities to political ecology (Grossman 1993). The only distinction, where it exists at all, is a more sophisticated treatment of state and class in political ecology (*Ibid.*) (e.g. Watts 1983, Hecht 1985, Bassett 1988).

organisations, as already indicated (e.g. Warford and Partow 1989). The type of political mediation, bargaining and power-relations that link nations through these multinational structures have therefore become more important. Their environmental significance is well illustrated for example, by Humphreys (1996) in his book *Forest Politics*. This international dimension is an important scale at which to look for elite influence and influence on elites (considered in Chapter 4).

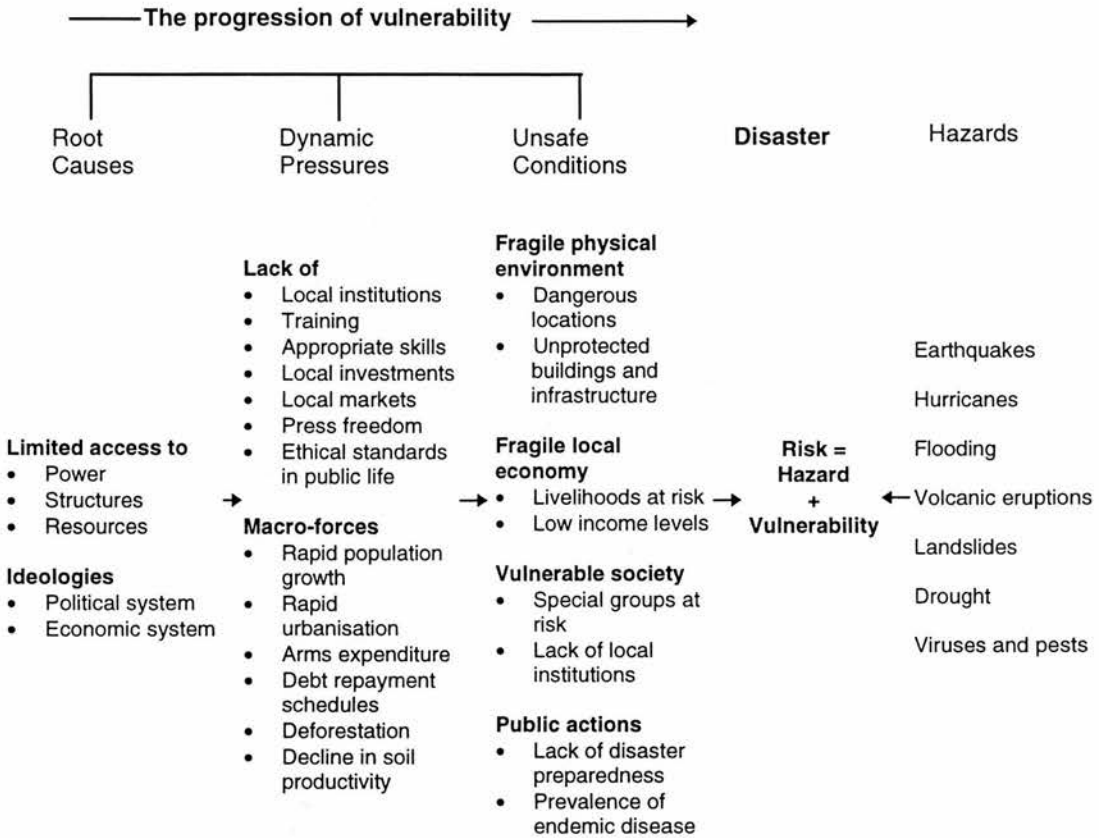
Finally within political ecology, smaller scale political structures have also been addressed. Village councils, trade organisations, unions and political parties are all notable organisational levels at which the allocation and use of environmental resources are influenced. All have their own structural mechanisms for mediating power and people/environment relations. Gender, wealth, kinship, race and ethnicity, religion, profession, and political affinity are all examples of the influences at this scale of political organisation that have been identified (Yapa 1979, Hurst 1990, Hecht and Cockburn 1989, Anderson and Huber 1988). The manifestations of these in relation to mangroves in Belize are evaluated in Chapter 6.

In combination, this broad range of scales, from macro to micro levels, have structures, rules and relationships that influence the way in which resources are exploited. They all therefore require consideration in this thesis, if mangrove exploitation is to be fully understood.

The second basic tenet of political ecology, already reflected in the consideration of political structures above, is that environmental degradation is brought about by influences which operate at a range of scales. Political ecology requires what Vayda (1983) calls 'progressive contextualisation' of the different forces which simultaneously act to influence people/environment relations. Picking an example, Blaikie *et al.* (1992) use this cascading scale of influences to explain the vulnerability of Third World poor to natural hazards. The set of influences at work, displayed in Figure 12, can clearly be applied to mangrove environments. The general point is that local conditions of production, over-arching regional social organisation of production, the national political economy (class and region inequalities), and international political economy (dependency and neo-colonialism) all delimit the socio-political and economic context of resource exploitation. This is especially important for countries, including Belize, whose development is being promoted on the basis of commodity export, a point examined in detail in Chapter 4. With increasing globalisation,

and more widespread penetration of capitalist modes of production, this multiple-scale analysis has therefore considerable relevance to the way resources are used.

Figure 12 Forces from a range of scales combine to create 'natural' disasters



Source: Blaikie *et al.* (1994)

Political ecology's third theme stresses the significance of inherited economic and socio-political frameworks in the formation of contemporary resource use (Grossman 1993). To understand current environmental exploitation, it argues that antecedent conditions and development trajectories need to be taken into account. As one aspect of this emphasis, Bassett (1988:454) flags up the transformation of indigenous systems of resource management in the process of incorporation into the global economy.

Others (e.g. Blaikie and Brookfield 1987) stress the significance of inherited socio-political structures and economic relationships as influences on resource use, especially the residual effects of colonialisation (reflected in government legislation and land tenure for example) (Redclift 1987). Importantly, this emphasis finds a parallel in the historical reflexivity of

elite research; both Cohen (1981) and Carter (1974) for example, stress the influence of antecedent forms of social organisation on the operation of present elites. The historical emphasis of political ecology is useful therefore, not only to identify any contemporary significance of past resource use, but also to take into account the evolution of elite characteristics and the structures in which they operate.

The fourth emphasis of political ecology relevant to this study is its focus on the 'differential responses of decision-making units to changing social relations of production and exchange' (Bassett 1988:454). Put another way, political ecology recognises that different stakeholders respond differently to socio-economic and political influences. Again, this emphasis meets the requirements of this research, which looks for differential behaviour of elite and non-elite stakeholders in their mangrove use.

The last important element of political ecology for this thesis is the acknowledgement that there are political ramifications of the functioning of the environmental systems themselves. Specifically, this examines how environmental features, processes and degradation are incorporated into concrete socio-political relationships. First of all, these encompass the fairly generic characteristics of environmental systems which have political bearing. To start with, cause and effect may be separated by significant time lags. Damaging actions may therefore be politically expedient because their adverse ramifications only appear beyond the (relatively short) political time horizon. Secondly, environmental systems are extremely complex. Consequently, answers required for 'optimum' decision making are often unavailable, allowing political procrastination on the basis of 'lack of evidence' or reversion to a politically hard-to-sell precautionary principal. That this question of complexity is important politically is best illustrated for coastal issues by responses to the threat of global warming and sea level rise [11].

In addition to these generic political aspects of environmental systems, several mangrove traits generate additional political issues. Firstly, their wide range of goods, functions and attributes generate a broad constituency of resource users. Secondly, the dichotomy between on-site and off-site resource is critical to the politics of mangroves, since on-shore values (timber, thatch, the land itself) are more readily captured by private interests, whilst

[11] In environmental management, it is also important to recognise that the allocation of research funding is also a political decision, representing trade-offs between competing interests.

off-shore ones are predominantly common property resources (fisheries stocks). Thirdly, with the decline of traditional means of resource allocation, mediation over mangroves is now normally carried out by the state, through statutory regulation of mangrove alteration (Johannes 1978), and this involves a wider range of stakeholders than was previously the case. Related to this is the consideration of tenure of mangrove wetlands. Inter-tidal areas are frequently subject to complicated or ill-defined ownership, and this generates a range of access and/or ownership disputes, many of which have local or wider political implications. A further politically-loaded consideration with mangroves is their combination of disadvantageous and advantageous characteristics. Their role in harbouring disease, and the blocking of sea breezes generate pressure for their removal, while their beneficial characteristics lead to demands for their protection (or restoration). Each facet tends to be related to a different set of stakeholders, and the resolution of any conflicts between the two is often politically mediated. Last of all, mangrove resource values are often not evenly distributed through time. Some processes which affect them are continual and incremental, whilst others are episodic and catastrophic. The most important feature in this respect is that mangroves are frequently located in storm and hurricane-prone sites. By encouraging mangrove clearance and not enforcing zoning or building standards, an episodic event like a hurricane may starkly expose the inadequacies, ineptitude and corruption of many actors involved in state mediation of mangrove use. Blaikie *et al.* (1994: 148) report, for example, that 'relief efforts in Jamaica following the 1988 Hurricane Gilbert were rife with partisan politics and corruption, so much so that mismanagement was one of the factors that led to the change in government in the elections that followed'. Clearly, here is a further feature of the mangrove environment that can also have a political dimension to it.

Summary: Over recent decades, widespread ecological degradation has taken place in many parts of developing countries, frequently with adverse impacts on the livelihoods of millions of people. Attempts to explain the cause of this degradation have been put forward, but recently political ecology has emerged as a hybrid approach that builds on the insights gained from the partial modes of explanation previously available. For all the reasons above political ecology has been chosen as the broad conceptual framework for analysis.

To complement this approach, and to investigate the individual influences over resource use, the research uses an analytical tool known as stakeholder analysis. Its origins, purpose and methodology are the last component of the research framework to be considered.

2.5 Stakeholder Analysis

2.5.1 Stakeholder Analysis - Scope, Purpose and Definition: Stakeholder Analysis (SA) is defined according to Grimble *et al.* (1995) as an approach for understanding a system by identifying the key actors or stakeholders, and assessing their respective interests. Stakeholders include all those who affect, and/or are affected by, the policies, decisions and actions of the system; they can be individuals, communities, social groups or institutions of any size, aggregation or level in society. The term includes international agencies, policy-makers, planners and administrators in government and other organisations, as well as commercial and subsistence users (*Ibid.*).

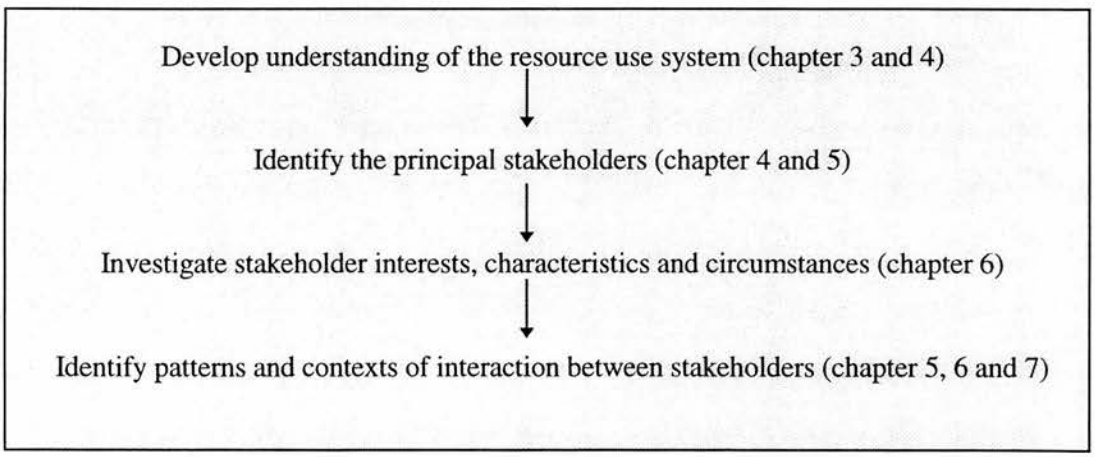
Justifying the use of SA: The use of SA in natural resource management stems from the recognition that many environmental policies and projects have failed to meet their objectives because their consequences are perceived to be adverse by one or more stakeholder group, leading to their non-cooperation or other forms of opposition (Grimble and Chan 1995). The goal of SA is therefore to gain an understanding of a resource issue by identifying the key actors in it, and assessing their respective interests. In particular, attention is paid to understanding conflicts of interest and trade-offs associated with many natural resource issues (e.g. Chan 1994).

As Grimble and Chan (1995) point out, there are many features of environmental issues for which SA is well-suited to encompass. Firstly, they often have externalities beyond the administrative realm of the site in question. These include transnational considerations, particularly germane to the macro-level political ecology. SA allows for these outside interests to be taken into equal consideration. Also, in many cases natural resources are publicly owned, with multiple users, acting in competition, and frequently pursuing incompatible interests. One example, commonly encountered with mangrove habitats, is their use in a natural state by fishermen, and conversion to growing out ponds for aquaculture. A further characteristic of natural resources is that some are non-renewable, and therefore temporal trade-offs have to be considered in addition to the balance between existing users. SA is also capable of analysing all these situations. Given these capabilities, SA is therefore being used in natural resource management to better anticipate and deal with stakeholder opposition and conflict, and therefore to improve policy and project design, and its implementation (e.g. ODA 1995). This is significant because it has advantages over other common methods of evaluating

environmental management projects and policies, particularly in assessing their on-the-ground 'implementability' and distributional impacts (Grimble and Chan 1995). Cost-Benefit Analysis (CBA) and Total Economic Valuation, the most widespread forms of policy and project appraisal (Winpenny 1991), fail to explicitly examine the distribution of costs and benefits among different stakeholders (Chambers 1984). They also ignore the fact that different stakeholders perceive environmental issues differently (e.g. Peritore 1993), and are likely to seek varying outcomes from policy or project interventions (Grimble and Chan 1995). The value of SA is therefore, as an additional approach in resource management, directed at understanding the private costs and benefits of resource exploitation options, as they are perceived by people involved.

Stakeholder methodology: SA has emerged from the field of management science (see Mitroff 1983 and Freeman 1984), but in its application to natural resource issues it relates to 'participatory methods' in its approach (Grimble and Chan 1995). In comparison to these methodologies however, the objective is to ensure that the whole range of significant stakeholders is considered, including those who can influence, or be influenced by the project or policy from outside the area. This requires a relatively diverse set of data collection techniques and a systematic research protocol. The procedure followed in this thesis, based on steps suggested by the ODA (1995) and Grimble *et al.* (1995), is summarised in Figure 13.

Figure 13 Sequence of steps for conducting stakeholder analysis



The basic features of these powerful elites have been considered in this chapter, along with the broad socio-political and economic factors which guide their operation. Existing evidence from the literature has also been collated on their involvement in mangrove

exploitation. This helps to inform the research that follows, and define the influences that need to be considered. Also in preparation for the analysis of elite influence in mangrove exploitation, the basic tenets of political ecology and stakeholder analysis have been identified, and their advantages over the more frequent approaches to understanding Third World environmental issues laid out. In the following chapters, the insights obtained from above will be applied to test the elite stakeholder hypothesis. To embark on this analysis, the first task is to identify Belize's mangroves and consider their resource value.

Mangroves and the Political Ecology of the Belizean Coast

3

Having set out the background to this research, Chapter 3 examines the important environmental features that influence the political ecology of its mangrove resources. Drawing from fieldwork and secondary sources, it begins by highlighting the physical characteristics that exert most influence on the development of the coast. The characteristics of its mangrove species and the communities they form are then examined. The physical and ecological attributes which endow mangroves with a resource value are highlighted next, establishing the environmental basis for stakeholder interests. Chapter 3 therefore provides the ecological basis from which to examine the socio-political and economic aspects of mangrove's political ecology, and the stakeholders involved.

3.1 Environmental Determinants of the Political Ecology of Belizean Mangroves

3.1.1 Influential Characteristics of Belize's Coast in Relation to Its Exploitation - Physical Geography: The physical composition of Belize's coast is described by Wright *et al.* (1959), Wantland and Pusey (1975), Hartshorn (1984) and King *et al.* (1986, 1989, 1992, 1993). Combining the insights from this work and the familiarity with the coast gained from extensive field work, four main coastal features have been identified that influence mangrove distribution. The first is the barrier reef lying off Belize's mainland. From the point on its northern coast where the shore and reef coalesce, it forms a shallow protected lagoon, widening and deepening southwards. The longest reef in the Western Hemisphere, and fifth longest in the world, it acts as a protective cordon, absorbing wave energy allowing more extensive mangrove to develop than would otherwise be the case. The lagoon is unevenly dotted with islands (locally known as cayes) of varying sizes (a few square metres to several hectares) and physiographic characteristics, grading from foundations of coral rubble, sand, mud and thick peats (Vermeer 1959, Stoddart *et al.* 1982a, Stoddart 1963, 1969) (Table 3). In addition to the barrier reef and the cayes behind it, Belize has three separate atolls further to the east (Stoddart 1962, Stoddart *et al.* 1982b). Turneffe, the largest, is formed by a fringing reef of modest leeward but significant windward development. It includes extensive land areas on large elongated cayes, but also has many smaller islands, in all totalling 110 km^2. In

contrast, the six cayes of Lighthouse and the seven of Glovers are smaller and only cover 7.8 km^2 and $0.8km^2$ respectively. Their surrounding reefs are more evenly developed, and more completely encircle their inner lagoons, which in both cases, are densely studded with small patch reefs. In all, there are 1,065 cayes dotted throughout the coastal zone (Zisman 1992) totalling some 689 km^2. The distribution of the various caye types are shown in Figure 14, with examples illustrated by Plate 1 and 2.

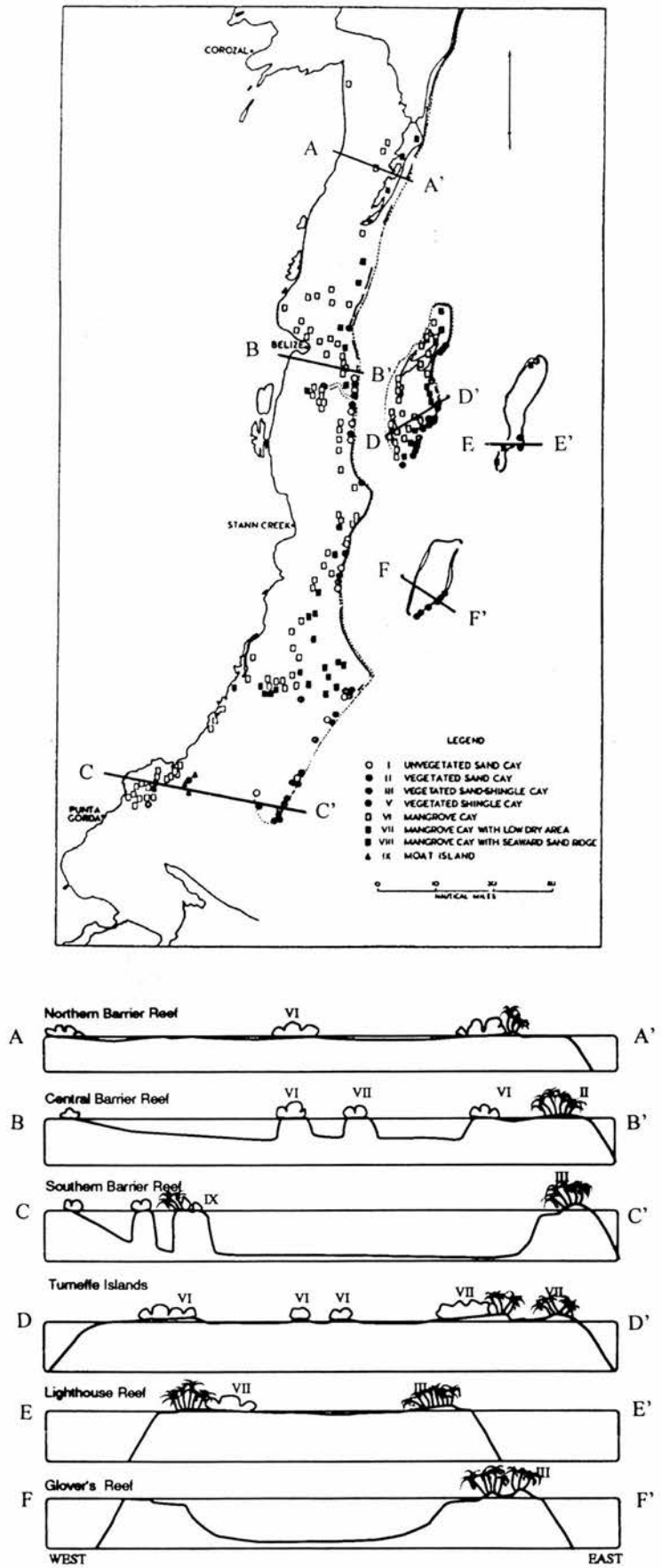
Table 3 A typology of Belizean cayes

Description	Morphological Types	Examples
Mangrove caye	Cayes in a lagoon and colonised by Rhizophora mangle	Jack's Caye
Mangrove caye with low dry areas	Mangrove islands with sand flats with dry sand on the windward side; usually in protected areas	Wild Cane Caye, French Man's Caye
Mangrove range	Extensive and complex array of mangrove islands separated by partially enclosed bays and lagoon	Tobacco Range and Drowned Cayes
Moat caye	Association of leeward sand area, interior mangrove swamp, lagoon and windward shingle ridge	Snake Cayes
Unvegetated sand caye	Small, ephemeral islands often forming and reforming following hurricanes	Punch Caye, Curlew Caye
Vegetated sand caye	Larger islands with strand scrub and woodland vegetation	Nicolas Caye, Tobacco Caye
Unvegetated shingle caye	Small ephemeral cayes in exposed situations	North Spot Caye, Ragged Caye
Vegetated small cayes	Located in exposed conditions	Cockroach Cayes, Turneffe
Sand and shingle cayes	Small, stable islands in exposed conditions;	Carrie Bow Caye
Shingle cayes	Often on small patch reef vegetation with a windward shingle ridge and leeward sand area	Northeast Cayes, Sapodilla Range
Coastal barrier caye	Barrier beaches or separated headlands	Harvest Caye
Shelf island cayes	Islands formed through sediment accretion on submerged topographic features in northern part of a lagoon	Caye Chapel, Caye Caulker

Source: Stoddart *et al.* (1982b)

This combination of inner lagoon and reef forms Belize's marine realm. It is rich in fish, crustacea and molluscs, and offers physically protected fishing grounds. The reef is structurally diverse, offering a significant attraction to scuba divers. For the cayes themselves, the most significant physical characteristics that particularly affect human use are their height above sea level and the presence or otherwise of freshwater. The suitable combination of these is relatively rare, so less than 1% of the cayes have permanent settlements (i.e. more than individual fishing camps and tourist lodges). These are St. George's Caye, Caye Caulker, Tobacco Caye, South Water Caye and Ambergris Caye (which is really a mainland peninsula separated by a small creek).

Figure 14 Distribution of caye types with cross profiles of coastal features



Source: Stoddart *et al.* (1982b)

Plate 1 **Aerial view of the Drowned Cayes, typical overwash mangrove islands described by Stoddart *et al.* (1982b) as a 'mangrove range'**

Plate 2 **Aerial view of Mauger Caye, Turneffe Atoll, surrounded by fringing mangroves. Between the ridges formed by this shoreline is basin mangrove. The island is a 'mangrove caye with low dry areas' (Stoddart *et al.* 1982b), partially cleared for a lighthouse**

The second significant determinant is the low-lying and flat nature of Belize's coastal plain. It slopes gently and evenly to the sea, stretching 30 km inland at its widest point in the north of the country. Combined with the protection afforded by the reef, this has led to the presence of mangroves along approximately 90% of the mainland. In addition, along the northern third of Belize's coast, brackish lagoons and flooding leads to extensive areas of mangrove and saltmarsh in this region.

The third major influence is the small tidal range of the Caribbean. It limits the breadth of the intertidal zone, with maximum recorded tidal variation of 0.3m (Hartshorn 1984). This restricts the majority of mangroves to a relatively narrow fringe and the lower reaches of most rivers. This also means the same is true of beaches, which occur in significant lengths in only a relatively few stretches.

The fourth influence arises from the character of coastal soils [1]. The unconsolidated nature of the peats underlying most mangroves increases the erosion risk if vegetation is removed. An important beneficial feature of the Belizean situation however, is the availability of buffering carbonate in the near shore environment and the lack of sulphide minerals such as jarosite in Belizean watersheds (Murray 1995). This avoids the acidification problems arising from the disturbance of acid sulphate soils reported elsewhere (e.g. Simpson *et al.* 1983, Dost and van Breeman 1982, Poernomo and Singh 1982). Properties of the adjacent soils have also had an influence on the fate of Belize's mangrove areas. The clay-rich soils of the coastal plain behind the mangroves are easier to work, with the added advantage of no saline influence. This partly explains why aquaculture developments have taken place on these savannas inland of the mangroves, because of their less demanding management requirements and cheaper construction costs. This has so far meant that aquaculture impacts on Belize's mangroves have been extremely modest in comparison to other countries in the region (quantified in Chapter 5). Finally in relation to soils, agricultural development on the coast has been limited by the infertility of the majority of its soils. The exception to this occurs on the bands of alluvium deposited along the rivers which cut across it (Wright *et al.* 1959, Baillie *et al.* 1993). Although prone to occasional flooding, these are fertile areas. As a result, the production of export crops, particularly bananas and citrus, is concentrated here, and so is the infrastructure for their export, specifically the port at Big Creek. The other agricultural exception is coconut cultivation. The impact of agriculture on mangroves is covered in Chapter 5.

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[1] Strictly speaking, the majority of material underlying mangroves are unconsolidated sediments rather than soils, since they are too young to have undergone any pedogenic processes. In addition, mangroves at certain locations grow directly on rock, typically platforms of limestone. However, for the sake of brevity, materials on which mangroves grow are referred to as soils throughout this thesis.

Coastal soils in Belize have been examined from both national and mangrove-specific soil surveys. From the national soil survey, five of the nine main soil types identified by Ballie *et al.* (1993) occur to varying degrees in the coastal zone. The Ycacos sub-suite of the Tintal Suite is the most widespread one supporting mangroves. The Shipstern sub-suite of the Turneffe Suite also underlies significant mangrove areas, and the Ambergris and Hopkins sub-suites are also moderately common. The Consejo and Buttonwood sub-suites of the Bahia and Puletan Suites respectively underlie minor areas. In mangrove-specific work, chemical and physical soil analysis has been undertaken by Furley and Ratter (1992), Murray (1995), and Minty *et al.* (1995). Findings generally confirm the patterns identified by Ballie *et al.* (1993).

Other factors: The location of Belize in the tropical storm belt, reflected in the records compiled by Friesner (1993), also has had specific implications for coastal development. They have repeatedly devastated coastal habitats and human activity. The 1931 hurricane nearly destroyed Belize City and took an estimated 1,000 lives, 2% of the total population at the time (Hartshorn 1984). Hurricane Hattie, the last major hurricane to strike Belize, killed 275 people and encouraged a wave of emigration to the USA. Both these and other hurricanes have also caused comprehensive damage to reefs, seagrass beds and vegetation of the cayes (Vermeer 1963, Stoddart 1966) [2].

The historical lack of development of alternative transportation, and the suitability of rivers for moving logs out of the interior, also mean that river mouths have had a long history of settlement. Their use for processing and shipment of timber led to the alteration of most freshwater swamp forest and mangroves associated with river mouths. These then are the features of Belize's physical geography which define the interaction of coastal inhabitants with their environment.

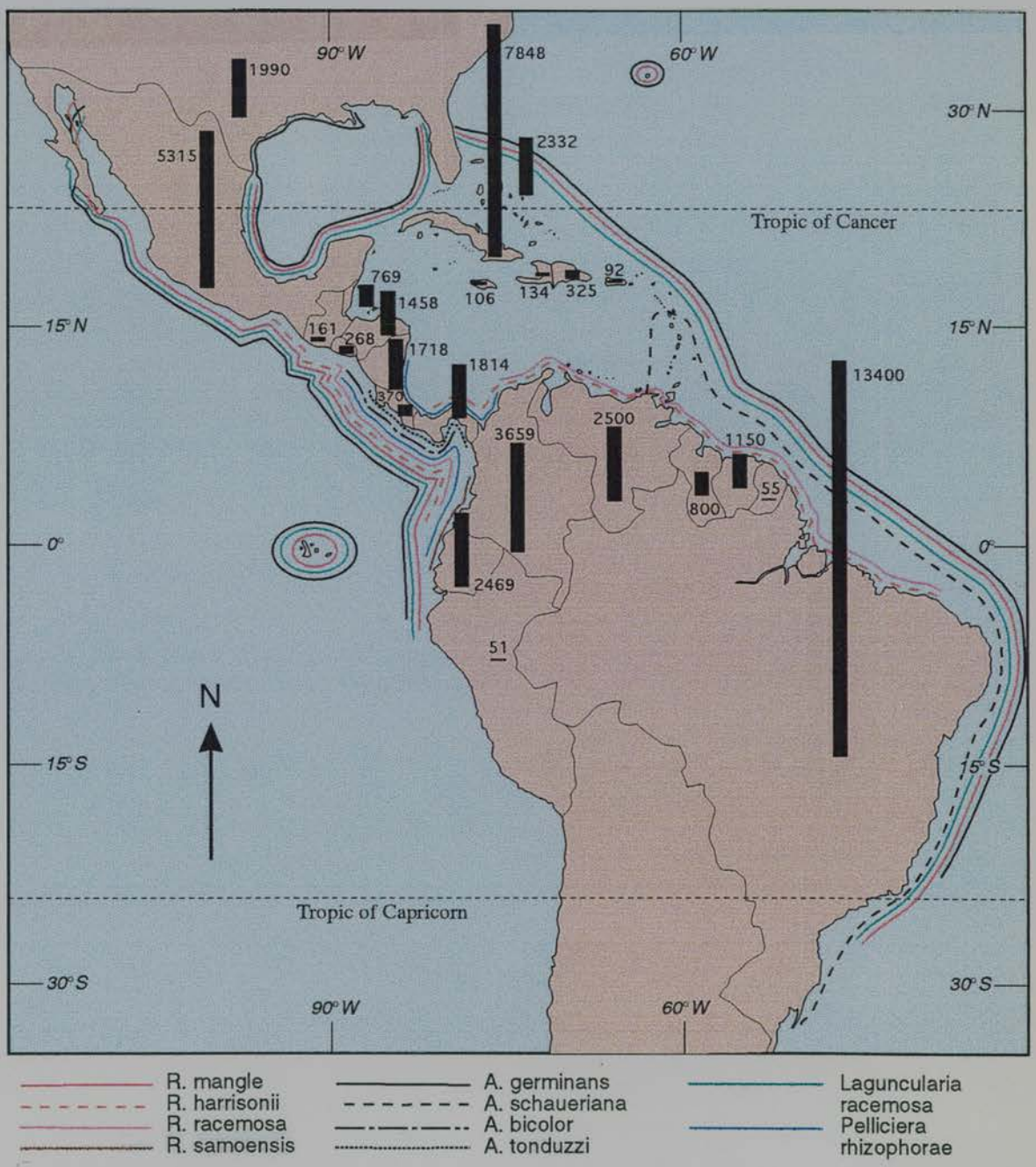
3.1.2 Coastal Vegetation and Its Relationship to Development: The vegetation supported over the Belizean landscape varies widely, depending principally on climate, soil fertility and drainage, and exposure to saline influence. The role plaid by Logwood (*Haematoxylum campechianum*) and Mahogany (*Swietenia macrophylla*) in the country's commercial history is well told by Bolland and Shoman (1977) and the legacy of their distribution still to be found in the configuration of land parcels that still survives in many riparian and coastal areas. However, for the study period, the only plants to be significant in terms of coastal exploitation are coconuts (*Cocos nucifera*) and mangroves. The following sections assess the characteristics of this latter group of species, their niches, communities and vulnerability to environmental change. The physical and ecological traits which make them important in terms of human use are also examined. Finally, the implications of natural and artificial changes to mangroves on these traits are then looked at in detail.

3.1.3 Mangrove Species in Belize - Their Diversity and Characteristics: In comparison to the evolutionary centre and maximum taxonomic development of mangroves, which is in the Indo-Pacific region (Lugo and Snedaker 1974), American species richness is relatively

[2] Hattie also resulted in the disbursement of overseas bilateral aid for the first time, initiating a pattern of intervention through aid that has become widespread. The subject of aid to Belize is examined fully in Chapter 4.

depauperate. The 10 species compare to 40 in the Old World (after Lacerda *et al.* 1993 and Duke 1992). Even so, the distribution of mangroves in the wider Caribbean region is relatively complex, with north/south and east/west (Caribbean/Pacific) axes (Lacerda *et al.* 1993). The distribution of all mangrove species in the Americas is shown in Figure 15, together with recent estimates for the area which they occupy.

Figure 15 **American distribution of mangrove species and their national extents (sq. km)**



Source: Bacon (1993), Lacerda *et al.* (1993), Thomas (1993), Tomlinson (1986), Penington and Sarukhan (1968)

The precise identity of mangrove species present was determined over a 42 year period, through work by Hooper (1886), Hummel (1925) and Oliphant (1928) [3]. Table 4 summarises their scientific and local names and that of their principal associate [4]. All three mangrove species found in Belize also occur along the west coast of Africa (Tomlinson 1986) where they are mixed with species of more southerly Latin American distribution. These mangroves in Belize occupy a wide range of wetlands, including permanently inundated swamps, inter-tidal, seasonally and episodically flooded areas. Structurally, they range from open dwarf scrub to closed canopy tall forest [5].

Table 4 Belizean mangroves and their associates

TRUE MANGROVES				
Family Name	**Scientific Name**	**English Name**	**Mayan Name**	**Spanish Name**
Rhizophoraceae	*Rhizophora mangle* L.	Red Mangrove	Tapche	Mangle Colorado
Aviceniaceae	*Avicennia germinans* L. (formerly *A. nitida* Jacq.)	Black Mangrove	(none)	Mangle Negro
Combretaceae	*Laguncularia racemosa* (L.) Gaertn.	White Mangrove	Zacalcom	Mangle Blanco
MANGROVE ASSOCIATE				
Combretaceae	*Conocarpus erectus* L.	Buttonwood	Kanche	Botoncillo

Source: Standley and Record (1936), Wright *et al.* (1959), Woods *et al.* (1988)

[3] The first technical examination of Belize's forests was undertaken by E.D.M. Hooper of the Indian Forest Department in 1886. Wilson (1886) made a number of river traverses in the same year but made no significant reference to mangroves. A decade later, a national vegetation map including mangroves was produced by Sapper (1896), but its accuracy was insufficient to be of use here. Comprehensive assessment of mangroves did not come for another 35 years. At this point, Hummel (1925), in his Review of Forestry in British Honduras makes several references to mangroves. He briefly notes local use of the 'mangrove tree', and describes four such species. Two he considers 'proper mangroves', the large-sized red mangrove *Rhizophora mangle*, and a dwarf *Rhizophora*, which he wrongly assumes is a different species. The tree locally known as white mangrove he considers is 'probably *Laguncularia racemosa*' but that it 'is no proper mangrove' (p. 56), an assessment he also makes for the tree locally known as the black mangrove (for which he gives no scientific name). Oliphant (1928) produced the first systematic classification and description of all the mangrove species present, elaborated on by Stevenson (1935). Work by Standley and Record (1936) on the first full botanical assessment of vascular plants of Belize failed to reveal any new mangrove species and the inventory of the true mangroves was complete.

[4] Although *Conocarpus erectus* is treated as a true mangrove in some more recent works, (e.g. Spalding *et al.* 1997), in this thesis the protocol of Tomlinson (1986) is followed and it is classified as an associate. As he notes, the species 'is better regarded as a mangrove associate because it lacks any of the morphological and biological features that characterise true mangroves; furthermore, it occurs in inland communities' (p. 232). This justification is suited to the Belizean context, in that *Conocarpus erectus* fails to form an integral part of mangrove communities but is part of freshwater marsh thicket and savanna associations.

[5] Following the UNESCO-adopted protocol of Mueller-Dombois and Ellenberg (1974), forest is defined as communities dominated by single-trunked trees at least 5m tall, and with crowns covering greater than 30% of the ground area. Open forests, referred to here as 'orchards' are those where tree crowns do not generally touch. Scrub communities are dominated by woody species which are generally multi-trunked and lower than 5m tall, and whose crowns cover at least 30% of the surface area. Thickets are denser scrubs in which the crowns generally are in contact. In the case of Belize, Jenkin *et al.* (1976) give a further useful and generally concurrent definition of this category. They classify thickets as dense woody vegetation of small trees and shrubs, frequently multi-stemmed, and varying in height from about 3.7m to 9.1m, with herbaceous ground cover rather sparse or absent, and (except in the case of secondary thickets), associated with impeded drainage and seasonal extremes of soil moisture. Also adopted here is their definition of savannas, as communities of continuous herbaceous ground cover of grass and/or sedges, with or without admixtures of trees and/or shrubs scattered singly or in discrete clumps, usually associated with impeded drainage, seasonal soil moisture extremes and frequent fires. The need for clarity is particularly important because mangroves occur in such a wide variety of structural forms. Hence, for example, whilst all mangrove clearance is wetlands degradation, it is not all deforestation.

***Rhizophora mangle*:** This species, locally known as 'red mangrove', is the most abundant and widespread of Belize's mangroves (Zisman 1992). Characteristic environments are brackish and saline depressions, riverbanks, and shorelines in sheltered areas, away from strong waves and currents (which prevent its viviparous seedlings from getting a permanent rooting). These seedlings will generally grow in water up to 30cm deep. *R. mangle* is capable of surviving on a wide range of soils, from coarse sand and coral fragments to deep organic peats. Respiration in these permanently saturated substrates is achieved through arching aerial prop roots, latticed with corky lenticels which allow the exchange of gases. *Rhizophora* develops best at low salinities (10-20 ppt) in shallow silty soils associated with abundant freshwater run off and rainfall (Jimenez 1986). It will grow at salinity levels of 40-50 ppt, but its development is poor under these conditions (Cintrôn and Schaeffer-Novelli 1982).

In response to such different environments, red mangrove grows in a variety of forms. Under optimal conditions, it reaches 30m or more in height, supported by prop roots 2-3m above the ground. In nutrient-poor saline environments, extensive stands of dwarf red mangrove develop, with mature trees as low as 0.4m (Feller 1995). It is a key colonising species in Belize, as its roots trap suspended organic matter, absorb wave energy, and help stabilise coastal sediments. It grows extensively on permanently flooded low-lying islands, the most extensive example being the Drowned Cayes east of Belize City. Although resistant to wind throw because of its root system, red mangroves suffer up to 100% defoliation following immersion in floodwaters or sea spray, both of which result from storms and hurricanes. In addition, leaves can be physically removed by strong winds (Stoddart 1963). Red mangroves are susceptible to changes in hydrology, a factor of critical importance when occurring in basin environments (see below). Permanent flooding with water that is not circulating causes mass mortality, many examples of which have been observed over the research period. As the species most often encountered fringing the water's edge, red mangroves are consequently the most commonly cleared mangrove, mainly to allow sea breezes to circulate landward. The functional importance of red mangroves is their direct organic input into adjacent waterways, provision of shelter and nursery habitat for subsistence fisheries and commercially important species, and protection of shorelines, minimising coastal erosion. They also have the capacity to absorb organic pollutants directly (particularly macro-nutrients associated with sewage and aquaculture pond outfalls) and capture pollutant-laden silt in their prop root networks. However, the low tidal range and resulting narrowness of mangrove belts inhibits the scope of this function in Belize. Characteristic features of *R. mangle* are shown in Plates 3-6.

Plate 3 **A typical example of tall red mangrove, *Rhizophora mangle***

Plate 4 **A typical example of dwarf red mangrove, *Rhizophora mangle***

Plate 5 ***Rhizophora mangle*** **prop roots in a young forest. These contain breathing 'outlets' which allow it to survive in waterlogged soils.**

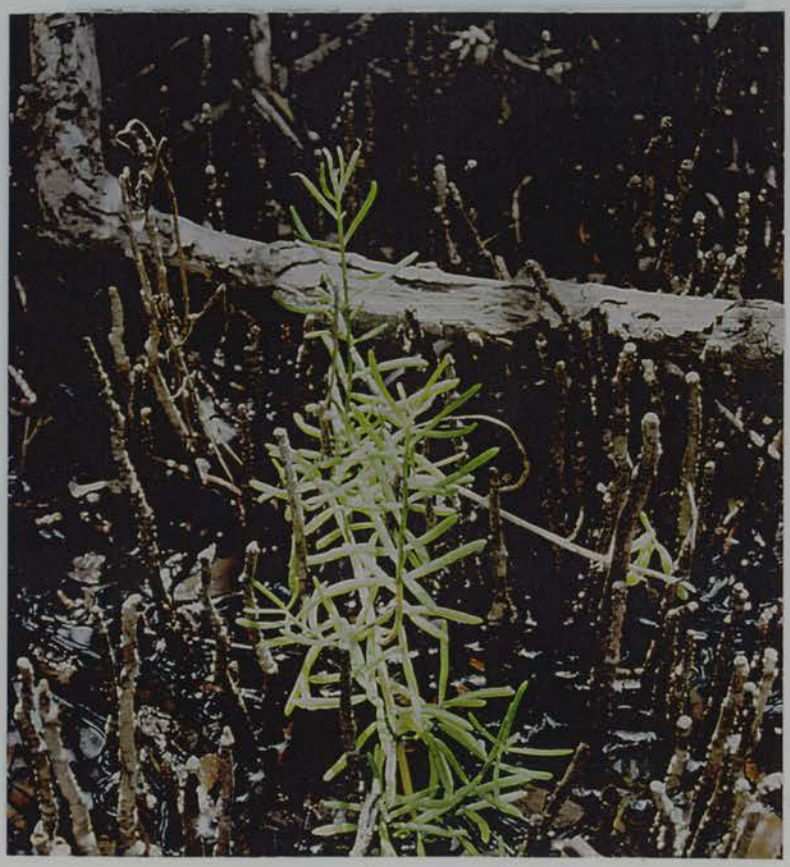
Plate 6 **Elongated** ***Rhizophora mangle*** **prop roots in a dwarf mangrove environment, performing the same essential function**

***Avicennia germinans*:** The higher salinity tolerance and smaller seed of this species (locally known as 'black mangrove'), make it the characteristic mangrove landward of the *R. mangle* fringe. Well developed forests grow where interstitial salinities are 60-65 ppt. *Avicennia* will however withstand salinities as high as 90 ppt, although this does result in stunted growth (Cintrôn and Schaeffer-Novelli 1982). Black mangrove seedlings are round rather than elongated, and are smaller than *Rhizophora's*, limiting the water depth in which they can germinate to approximately 10-15 cm. Their size does, however, have the advantage of enabling dispersion through the dense network of pneumatophores. These vertical extensions from its roots enable the plant to exchange gases, and growing to a maximum of approximately 30cm in height, restrict the species to areas where prolonged floods are no deeper than roughly 35cm. With these characteristics, black mangrove frequently grow in shallow basin environments, particularly on low-lying cayes. In terms of soil conditions, the species tolerates a wide range of sandy, silty or clay conditions. It occurs in a variety of growth forms, from tall single-trunk trees to small scrubby shrubs. In the Caribbean, black mangrove forests do not usually exceed 15m, even though on the wet Central American coast, trees of 36m (with a diameter at breast height of 1.8m) can be found (*Ibid.*). At the other extreme, where conditions are limiting, some mature (reproductively active) individuals are only 20cm tall. Variations in temperature, soil conditions (salinity, texture and fertility) and hydrology (freshwater input and degree of flushing) are responsible in such cases. Black mangrove is highly susceptible to changes in hydrological patterns. Drought or long-term flooding above the height of pneumatophores can cause extensive mortality. The species is shallow rooting and easily wind thrown. Pure stands of black mangrove forest are scarce, confined principally to larger low-lying cayes and the Belize River/Haulover Creek Delta, where they are being extensively cleared for urban expansion and waste disposal (examined in Chapter 5). Relatively small areas of dwarf scrub black mangroves are the only other stands where black mangroves are dominant. Characteristic features of black mangroves are shown in Plates 7-8.

***Laguncularia racemosa*:** 'White mangrove' has a similar range of growth forms to the black but develops best in moderate to low salinity conditions. It typically occurs to the landward fringe of the mangrove community but also pioneers readily into disturbed sites where it can form pure stands (Tomlinson 1986). This has been observed in Belize, both on artificially disturbed sites and in areas of hurricane damage (e.g. Blackbird Caye, Turneffe). Branch abortion is frequent so that trunks are characterised by numerous dead or dying branches (*Ibid.*). It is able to produce pneumatophores if growing in more permanently inundated areas

Plate 7 **A typical example of a tall black mangrove, *Avicennia germinans***

Plate 8 ***Avicennia germinans* pneumatophores. These allow the plants to 'breath' by extending out of the waterlogged soil and above the normal level of flooding.**



(Davis, 1943), but these will not reach the length of *Avicennia's* so it is restricted to sites with only shallow inundation (around 10cm and less). According to Tomlinson (1986) there seems to be a clear distinction between seedling and non-seedling trees, i.e. not all individuals fruit. White mangrove is found on substrates ranging from well drained peat to organic sand. Being the most landward of the mangroves, as human activities take up all available dry land and begin to penetrate mangrove areas, this is the species first affected. It can also be coppiced. It is a prolific coloniser and initially replaces black mangroves where these have been cleared. An example of white mangrove is shown in Plate 9.

Plate 9 **Typical specimen of the white mangrove, *Laguncularia racemosa***

***Conocarpus erectus*, the principal mangrove associate:** Known as 'buttonwood', this is the species most loosely associated with saline conditions, commonly occurring inland of white mangrove, on the mainland and on many cayes. It is intolerant of flooding and therefore occurs beyond the limit of any prolonged or frequent flooding. Tomlinson (1986) reports that it is tolerant of high salinities although this is contradicted by Cintrôn and Schaeffer-Novelli (1982), who suggest that it has a low tolerance, usually occurring in waters with salinities below 5 ppt. Observations in Belize suggest it grows in both low and high salinities. It is for example, a common component of the brackish savannas, where salinities can be extreme

(Furley and Ratter 1992). It develops best on sandy or rocky substrates (Cintrôn and Schaeffer-Novelli 1982) and appears most tolerant of dry soils. Buttonwood is generally shorter than the other mangrove species, and frequently occurs in a multi-stemmed scrubby form, with frequent and irregular branching (Coultas 1978). It does not produced useful timber, but its wood does have a high calorific value. Its seeds float and are therefore dispersed by water. A form of buttonwood (var. *sericeus* Grisebach and synonymous with *Conocarpus pubescens* Schumach.) has thin dense hairs covering the leaves, giving the tree a distinct silvery appearance. This would seem to be a mechanism for water conservation and therefore may indicate dryer or more desiccating conditions. Not surprisingly, it is only found in northern Belize, where conditions are in fact, drier. A typical specimen is shown in Plate 10.

Plate 10 **Typical specimen of buttonwood, *Conocarpus erectus***

3.1.4 The Physical Basis of Mangrove's Human Use: The basis of mangrove's significance to people rests on several characteristics. The first is the role of prop roots and pneumatophores in trapping sediment. Early work by Davis (1940), within the frame of succession theory, postulated that mangroves were essential elements in the consolidation and extension of coastal land through this ability. Subsequent work has questioned this role (e.g. Lugo and Snedaker 1974), and instead it is now recognised that mangroves respond to, rather than govern, the rate of sedimentation. A more precise definition of their land building role is

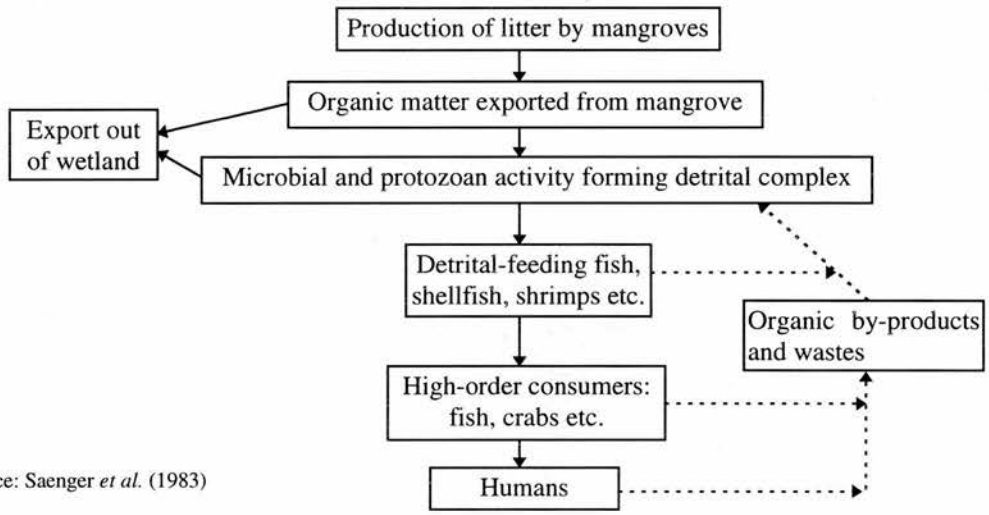
therefore possible, which is based on their capacity to consolidate sediment that is delivered to coastal fringes and river banks. The second closely related physical attribute of mangroves is their ability to resist erosion. Again, current thinking suggests a mediating rather than deterministic relationship with the presence of mangroves. Experience shows that their removal will often lead to increased localised erosion, and fishermen and tourist operators often mentioned this in discussions, citing examples from various parts of the coast. Whilst they reduce the rate of retreat, mangroves are not however, able to prevent it if erosion forces persist. The large belt of toppled *Avicennia* at Mother Point in southern Belize provides local evidence for this (pers. obs.). Accelerated erosion from clearing mangrove can have adverse effects nearby, and there are cases where adjacent beaches have been eroded or suffered from deposition of mud. The third noteworthy physical characteristic, especially given the overlap of mangrove and hurricane distribution, is their buffering capacity against wave and wind energy during storms. This is certainly relevant to Belize's situation. The actual significance of mangrove protection is extremely difficult to assess, and there are only rare published findings from detailed research on such events (e.g. Mazda *et al.* 1995), despite repeated reference in discussions on mangrove benefits (e.g. Pons and Fiselier 1991, Bacon *et al.* 1988). The importance of mangroves for storm protection is, nonetheless, evidently dependent on the structure and depth of the mangrove zone, the location of settlements in relation to mangroves and the direction of the storm (Othman 1994). It can also be argued that in an urban setting, shoreline buildings and artificial sea defences provide better protection to landward property. In rural areas, the same might apply for earth banks. Nonetheless, overall a high proportion of mangrove management activities are based on harnessing these protective physical characteristics. Examples from Belize include the protection and planting of mangrove buffers to prevent increased shore or riverbank erosion (planting is particularly common on Ambergris and other cayes, often to reverse erosion caused by mangrove clearance in the first place). These practices are common elsewhere, but undertaken on particularly large scales in Bangladesh and Viet Nam, where major planting programmes are underway (Spalding *et al.* 1997). In Florida, a further use is the planting mangroves to help consolidate dredge spoil, deposited in shallow sea areas (Clark 1996).

The other significant mangrove physical attributes are specific to the prop roots of fringing and riverine *Rhizophora*. Firstly, the prop roots give shelter to several species of juvenile fish. The labyrinthine maze of submerged roots offers shelter from larger predators who are simply too large to get in (Turner 1989:124). Secondly, the roots provide a large surface area for

colonisation of sessile organisms. Again, this has a bearing on fisheries productivity, as it provides a solid substrate for the settling out of the planktonic stages of marine organisms. Evidence for this has been found in Belize by Barrick (1989), during work at Hol Chan Marine Reserve. He demonstrated the importance of *Rhizophora* prop roots for the settling of Spiny Lobster larvae (something of a misnomer since this 'lobster', the most important contributor to Belize's commercial fishery, is in fact, a crayfish *Panulirus argus*). Other research in Belize is also revealing significant sponge and tunicate biodiversity on these root systems, both in terms of species richness and the presence of rare species (Goodbody, pers. comm. 1996).

3.1.5 The Ecological Basis of Mangrove's Human Use: Odum (1970), Odum and Heald (1975), Turner (1977, 1992), and Lopez *et al.* (1988) amongst others have examined the ecological functions that give mangroves their value to humans. In particular this work has considered their role in sustaining near-shore fisheries productivity. As summarised in Figure 16, mangrove litter and the nutrients from its breakdown contribute to food chains which support commercial and other species of fish and crustacean.

Figure 16 Aquatic food web for mangrove fisheries

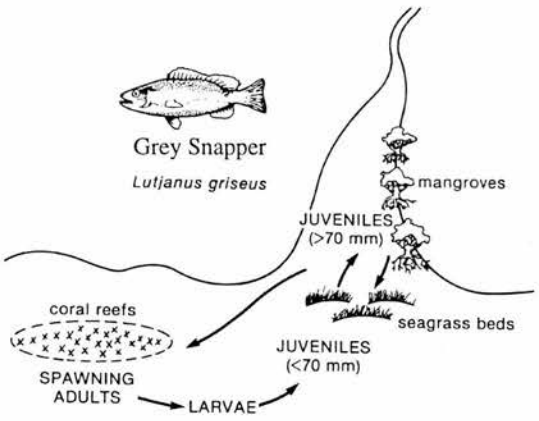


Source: Saenger *et al.* (1983)

Analysis of this people/fish/mangrove relationship has taken four basic approaches. The first method is to examine the life cycle of commercially important fisheries and aquaculture species to demonstrate the important contribution made by mangroves (e.g. Macintosh 1983, FAO 1982, Kapetsky 1983, Doumier *et al.* in press). Mangrove use by Grey Snapper (*Lutjanus griseus*), a significant subsistence species in Belize (S. Auil pers. comm. 1992) is one example. Equivalent work has also been done on shrimp (*Penaeid* spp.). Illustrations of both life cycle dependencies are shown in Figure 17.

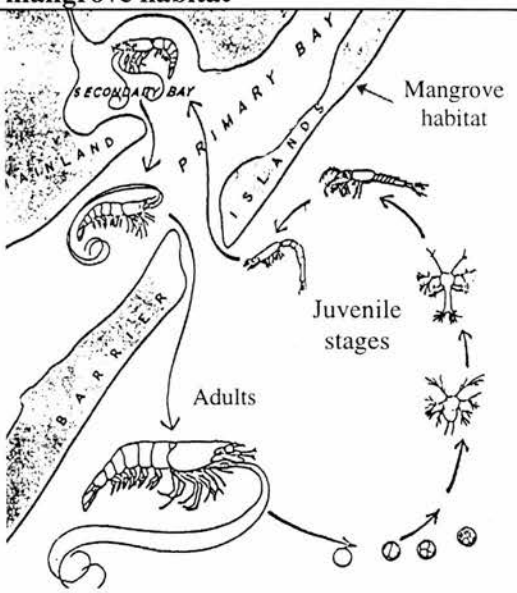
Figure 17 Use of mangroves during the life cycle of commercially important species

Grey Snapper (*Lutjanus griseus*) life cycle in relation to mangrove habitat



Source: Salm and Clark (1984)

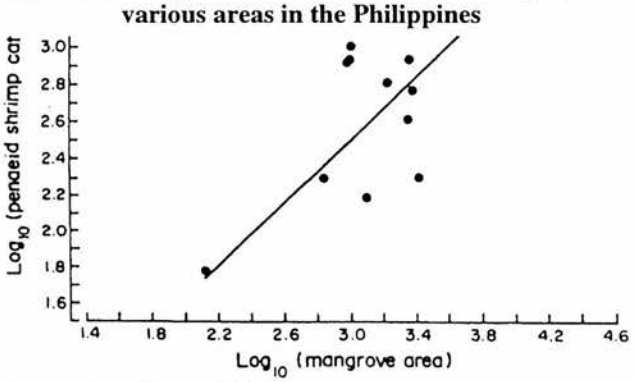
***Penaeid* shrimp life cycle in relation to mangrove habitat**



Source: Paw and Chua (1988)

The second approach has looked at the diet of adult species found near shore. Odum (1970) for example, analysed the stomach contents of coastal fish in Florida and found that 80% of commercially important species included mangrove detritus in their diet. The third approach has been the examination of comparative abundance between coastal habitats. Along this line, Carter and Sedberry (1990) examined the comparative abundance of fish between mangrove, seagrass and sand/rubble habitats of southern Ambergris Caye, and found that 75% of all fish collected were from mangrove areas. Of the two commercially important species amongst these, one, the Nassau Grouper (*Epinephelus striatus*) was significantly more abundant in mangrove. Finally, the correlation has been examined between mangrove area and fisheries catch. Several authors have identified significant relationships between these parameters. The details of one assessment for shrimp is shown in Figure 18, from the work of Paw and Chua. (1988).

Figure 18 Mangrove/shrimp catch relationship for various areas in the Philippines



Source: Paw and Chua (1988)

In combination, the resulting body of work unequivocally demonstrates the importance of mangroves for fisheries productivity. Given the importance of aquatic species as a source of protein for coastal inhabitants, this role is arguably the greatest ecological benefit of mangroves to arise from mangrove ecosystems (Macintosh 1983).

Other ecological benefits from mangroves are not harnessed in such a widespread way, but are locally significant nonetheless. Foremost in this category is the use of mangroves for 'bio-purification'. Waste effluent with high nutrient loading can be passed through mangrove habitats for the plants to absorb a portion of the nutrients. The resulting 'polished' effluent is then allowed to return to adjacent waterbodies for dilution and dispersal as normal. Work by Robertson and Phillips (1995), Landers and Knuth (1991), Chiang and Lee (1986), has demonstrated their useful function in this respect. It is an increasingly important one because of growing eutrophication problems in many coastal areas, and the sensitivity of sea grass and reef habitats to this form of pollution. As this purification function becomes better understood, mangroves are beginning to be harnessed to treat effluent from shrimp ponds and sewage treatment works. In Belize, for example, the new sewage treatment works at San Pedro, Ambergris Caye has been designed with this polishing process integrated into its design (Environmental Solutions Ltd. 1995).

The ecological traits relevant to terrestrial uses of mangroves relate to its use for timber and non-timber products [6]. A variety of mangrove species are harvested for fuelwood and conversion into charcoal (Saenger *et al.* 1983). *Rhizophora* and *Laguncularia* in particular have high calorific values and are widely used in Central America for this purpose. *Laguncularia* has the additional benefit that it coppices and is fast growing. Poles are also harvested and used for a variety of purposes, including light construction and markers. Foremost among non-timber products is honey, which is produced from *Avicennia* mangroves in particular. Mangrove habitats also support a variety of terrestrial wildlife, of which wildfowl are harvested for food and sport. All these products add another element to the ecological benefits that mangroves contribute to coastal inhabitants.

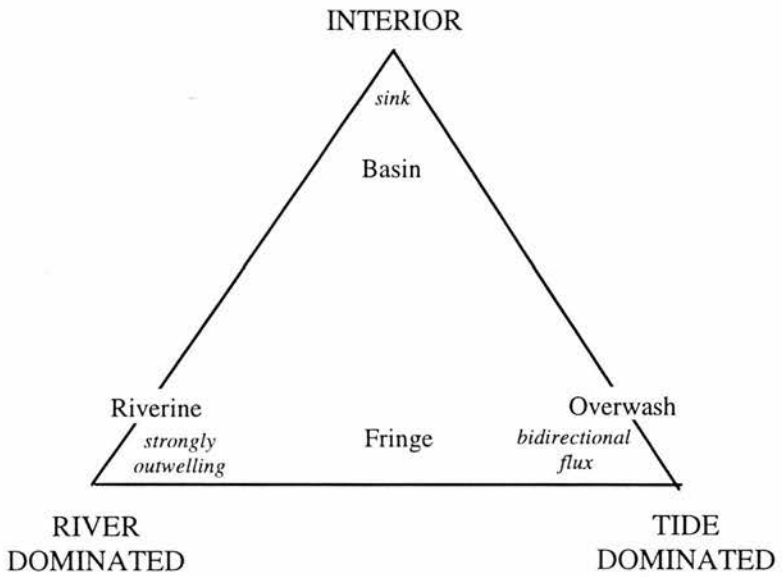
Spatial variability in mangrove functions: It would be wrong however, to view all mangroves as equally performing the benefits discussed above (Bacon pers. comm. 1997). This

[6] For the sake of brevity, only those relevant to Belize are discussed here. For a fuller inventory of these products, the reader is referred in the first instance to Saenger *et al.* (1983).

is important in management because trade-offs are often required, demanding a choice of which mangroves are protected and which are lost. Many wetland scientists urge precaution (some even suggesting a universal importance) on the one hand, whilst practitioners have to make the best professional judgements at any one time, based on their experience, intuition and information available at that point. In addition, different stakeholders have their own perceptions of which mangroves are important and which are not. This will be returned to in later chapters, as these perceptions need to be assessed for their influence on mangrove use.

Evidence shows that several physical factors, particularly related to the export of mangrove-derived organic matter, influence the functional value of mangroves. An example of this is diagramatically expressed in Figure 19, illustrating the influence of physiographic setting on the destination of mangrove detritus.

Figure 19 **Mangrove geomorphological and physiographic characteristics in relation to nutrient outwelling**



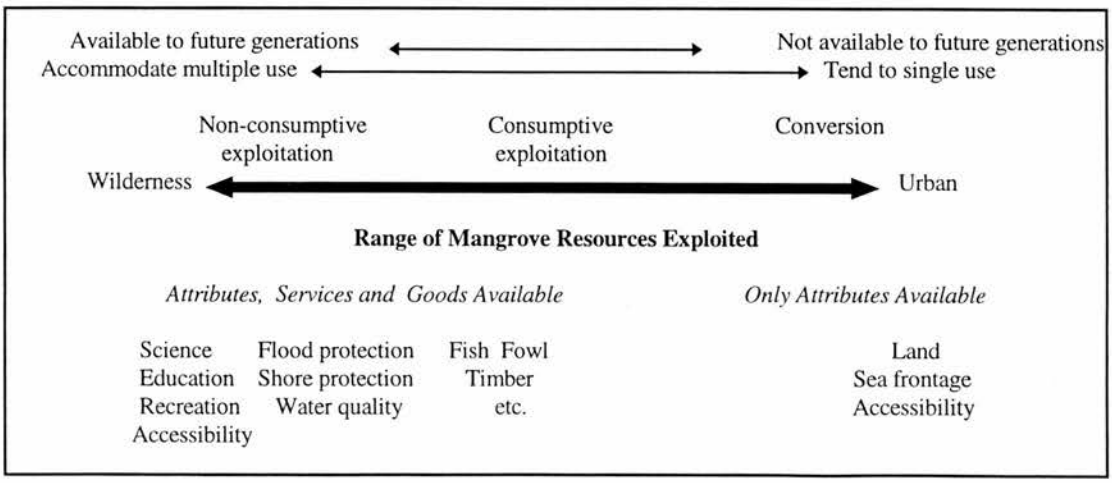
Source: Adapted from Woodroffe (1996). The hammock and scrub classes of Lugo and Snedaker (1974), also used by Woodroffe, have been dropped as they are considered simply to be variations of basin environments. That variation is shown here by the portion of the triangle covered by the arrow. River-dominated habitats are characterised by strongly outwelling mangroves; tide-dominated habitats are characterised by bi-directional fluxes; and interior habitats are typically sinks for sediment, organic matter and nutrients.

Other factors attended to have been drainage basin size area (e.g. Lugo and Snedaker 1974), geomorphological setting (e.g. Thom 1967) and hydro-dynamics (e.g. Wolanski *et al.* 1990). Differential levels of biomass productivity are the resulting characteristics which have received most attention, with an implicit assumption being made that high productivity mangroves are more important. Additional to these ecological factors, is the desire to protect fringing

mangroves for their physical role in minimising erosion and harbouring juvenile fish. In Belize, these properties have led coastal zone managers to place priority on mangroves out on the cayes, rather than on the mainland (J. Gibson, pers. comm. 1995). In terms of this thesis, this type of differentiation is important because the mangrove resource is not valued equally across all points. Stakeholders may therefore compete for control over more 'valuable' mangroves, or have interests allied to a particular part of the mangrove environment.

3.1.6 Mangrove Resources: A Re-defined Portfolio: Since a resource is defined as something of use to a person or group, then the resource value of mangroves is the range of uses for which the ecosystem is exploited. The range of mangrove benefits above is not however, a complete inventory. In elaborating wetland benefits, the types of 'value' presented usually take sustainable exploitation as the frame of reference. Barbier (1989) and Dugan (1990) provide typical examples, evidently because of their conservation perspective. Implicit in this is the retention of the mangroves. However, these are not the only source of value. Most importantly, the land the mangroves occupy can, itself, be of considerable value, regardless of the provision of other benefits. Further, the combination of resources which any one mangrove area can simultaneously provide is limited. Mangroves also have a number of dis-benefits, particularly in relation to nuisance from insects, smell, and the blocking of sea breezes. The portrayal of mangrove resources has therefore, on the whole, been far too simplistic. This is important, because without an accurate assessment of its resource value, there can be no adequate identification of mangrove stakeholders or appreciation of their motives. Ruitenbeek (1992) provides one example which goes beyond these limits. However, here Figure 20 serves to emphasise the more comprehensive resources associated with mangroves.

Figure 20 Complete mangrove resource 'portfolio'



The interaction between stakeholders determines the combination of mangrove preservation, multiple use and conversion that results on the ground. The nature of these interactions is examined in later chapters, but as a prerequisite, more detailed knowledge of Belize's mangroves is needed. In the remainder of this chapter, these habitats are characterised.

3.2 Belize's Mangrove Sub-Communities

This section gives the results of work to identify the types of mangrove community occuring in Belize and the likely impacts of development. The foundation for this was fieldwork undertaken in 1991. Substantive subsequent refinement resulting from fieldtrips in 1992, 1993 and 1996 has produced the detail below. Whilst this latter work was undertaken alone, the research in 1991 was completed jointly with other members of a University expedition. Team composition and expedition results are given in Furley and Munro (1993). The subsequent analysis attempts to go beyond the characterisation achieved in 1991, and therefore aims to add to the original body of work constituting this thesis.

3.2.1 Previous Research: Until the late 1980s, and despite their widespread occurrence along the majority of the coast and cayes, mangrove information at a national level was confined to brief descriptions in forestry and agriculture reviews (Hooper 1887, Hummel 1925:56, Oliphant 1928, OFI 1989 plus Wright *et al.* 1959, Jenkin *et al.* 1976, King *et al.* 1986, 1989, 1992 respectively). Scant detail was given as mangroves were considered of little value. Other details stem from early botanical inventories of the country (Standley and Record 1936), but overall, information on Belizean mangrove characteristics was limited.

Only towards the end of the 1980s did mangrove research increase, in response to highly conspicuous escalation of mangrove clearance around Belize City, and the start of coastal zone management attempts (IUCN 1993). A rapid succession of applied studies was initiated with two Edinburgh University WWF-US and ODA projects (1989 and 1991 respectively). The first, on mangrove mapping, was produced by Gray *et al.* (1990). Preliminary results of the second, mainly on species composition, soils and topography were reported in Furley and Ratter (1992), with further details in Furley and Munro (1993). Following immediately on from this, further research was carried out over 1992-93, through the auspices of the FPMP. This resulted in a review of mangrove exploitation by the author (Zisman 1992), as ground work for subsequent recommendations and management plan (Zisman 1993) to improve mangrove protection.

Site-specific mangrove research has a slightly longer history in Belize, with work underway since the late 1950s. Vermeer's (1959) comprehensive work on the cayes was built upon by a long series of work by Stoddart and co-workers (Stoddart, 1962, 1963, 1969, Stoddart *et al.* 1982a, Stoddart *et al.* 1982b, Fosberg *et al.* 1982). These characterised the vegetation and physical characteristics of the cayes, and the hurricane and human impacts upon them. A prolific research output on the cayes has also been produced under the auspices of the Smithsonian Institution (under the Smithsonian Western Atlantic Mangrove Programme - SWAMP), from their marine field station at Carrie Bow Caye, a small sand caye on the reef crest near the central section of Belize's barrier reef. From 1980, mangrove research became the primary focus for researchers working at this facility. Twin Cayes, a 92ha range of intertidal mangrove islands, have been the principal study site for many of these research projects. These include baseline studies on the hydrology and geomorphology of the mangrove ecosystem, environmental factors which affect mangrove growth, development, herbivory, and forest structure, and numerous projects on the taxonomy, biodiversity, morphology, physiology and behaviour of intertidal and subtidal organisms associated with mangrove forests (Rützler and Feller 1996). Site-specific research by other workers includes Wantland and Pusey (1975), who produced detailed geomorphological analysis of Belize's coastal shelf, including notes on plant succession in coastal lagoons containing mangrove, such as Midwinter, Bennets and Northern River Lagoons. Johnson and Chaffey (1974), Jenkin at al. (1976), Minty *et al.* (1995) and Heymann *et al.* (1995) provided mangrove community descriptions and distribution maps for small study areas. West (1977) reported on the brackish savanna communities of Ambergris Caye, and Meerman and Boomsma (1993) give extensive information on the flora and fauna of the Shipstern Nature Reserve [7]. Edge effects of mangrove clearance have been examined by Murray (1995).

Some additional information relevant to Belize is also available from comparable research elsewhere, notably the regional framework provided by Beard (1944) and Holdridge (1947), together with studies from Florida (e.g. Davis 1943, Odum *et al.* 1982), the Caribbean and the Central American coast (e.g. Lacerda 1993).

Investigations of the socio-environmental impact of mangrove clearance is by comparison, extremely limited, with studies for Placencia and Belize City completed by Ross *et al.*

[7] Shorter studies on other mangrove sites are referenced in Zisman (1996).

(1993) and McShane (1991) respectively. Even these were carried out at the early stages of their authors' careers (as undergraduate and masters degree theses, respectively), and reveal relatively little about the social, economic or political relations that are involved in mangrove exploitation. Instead the focus was on mapping the time-series of mangrove loss for these areas, using air photos and ground-truthing, with the principle causes of clearance identified. Whilst tourism was revealed as the main factor in Placencia and housing development in Belize City, attention was not given to identifying the individuals responsible for change. This thesis therefore examines an issue that has not previously been researched.

3.2.2 Principal Mangrove Sub-Communities Characteristics and Their Development Implications: Variations in the climatic, physical, biological, and chemical characteristics of coastal environments interact with the different tolerances of the three mangrove species and their associates to form a distinct and large range of mangrove sub-communities in Belize, especially considering its small size [8]. Researchers have attempted to classify resulting plant associations according to species composition (e.g. Watson 1928), geomorphological setting (e.g. Thom 1967), physiographic environment (e.g. Lugo and Snedaker 1974), structure (e.g. Smith 1992), and hydro-climatic regime (Holdridge 1947). Until the exact linkages of mangroves with surrounding ecosystems are better understood however, the choice of a suitable basis for classification is only one of convenience, instead of one with any true ecological significance. The classification developed by Lugo and Snedaker (1974) is based on physiographic features, and is thought to at least provide a subdivision which reflects the hydrologic linkages with associated ecosystems (Figure 21).

Figure 21 Classification of mangrove environments using physiographic features

Overwash Fringing Basin Riverine

Source: After Lugo and Snedaker (1974). Their scrub category has been dropped as it just a variant of the basin one. Their hammock category has been dropped as it is a minor variant within basin environments.

[8] Research to determine the exact nature of these relationships has examined the roles of salinity (Cintrôn and Schaeffer-Novelli 1978), flooding depth and frequency (Chapman 1976, Davis 1940), soil composition (Coultas 1978), seed dispersion (Rabinowitz 1978) seed predation (Smith 1987) and nutrient supply (Poole *et al.* 1975). All have been investigated and shown to be significant to varying degrees.

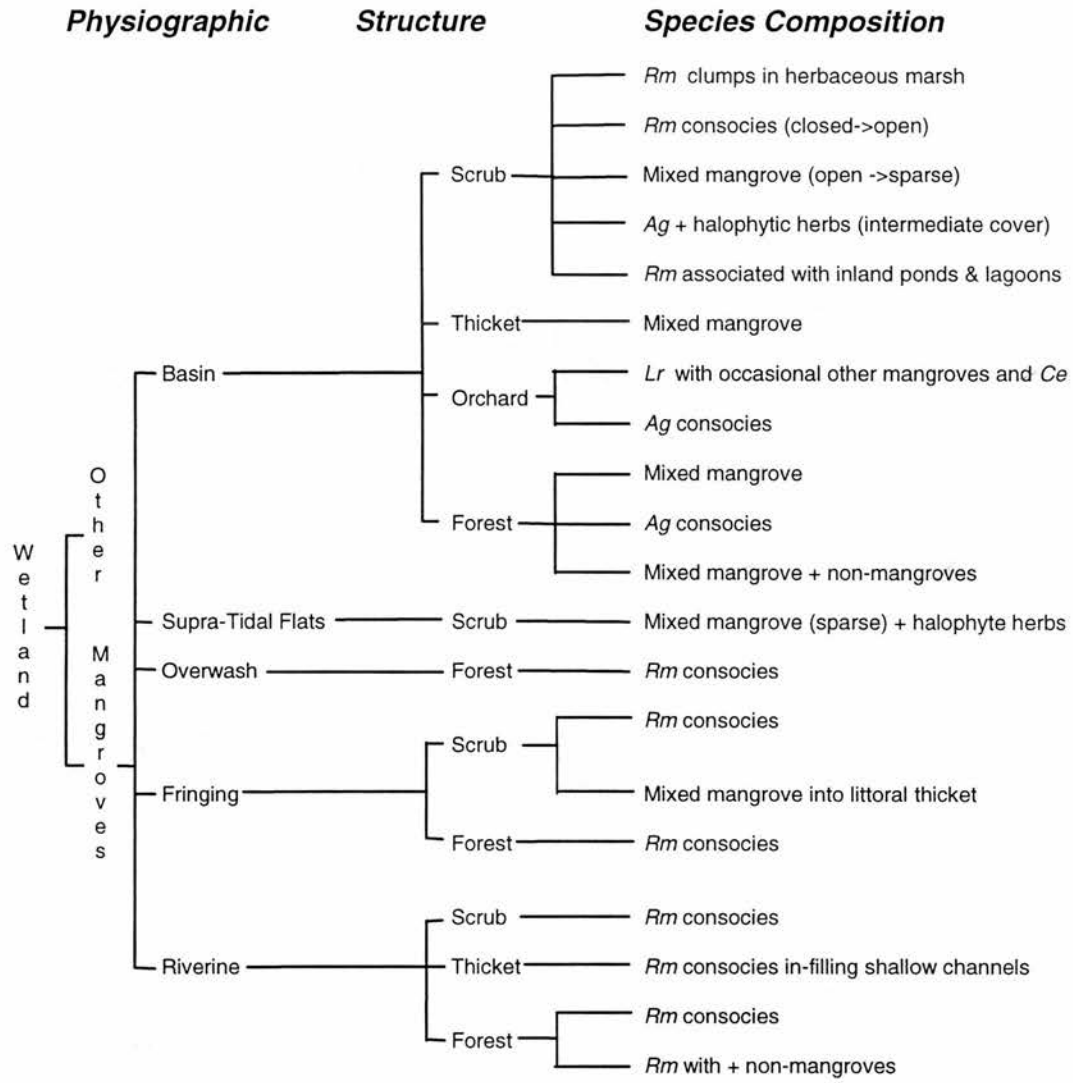
The classification has received some criticism. According to Tom J. Smith III (pers. comm. 1992) the breakdown, derived primarily from work in Florida, has been found to be too simplistic for mangroves with greater tidal ranges, species diversity and more varied coastal geomorphology. However, in Belize, which shares many physiographic characteristics with Florida, the classification provided a satisfactory starting point. A full characterisation of Belize's mangrove sub-communities was completed using standard quadrat and point-centred quarter methods, both widely used for this kind of analysis (see Cottam and Curtis 1955). This is the first such survey, and the detailed results are included in Appendix 3 and 4. The classification derived is a hierarchical one, which firstly distinguishes sub-communities on the basis of physiographic setting, and descends through further distinctions by physiognomic structure and species composition.

Within five basic physiographic settings, 20 sub-communities have been identified on the basis of structure and species composition (Figure 22). Depending on soil, topography, salinity, exposure and drainage, the habitats associated with these mangrove communities are littoral thicket and forest, broadleaf forest, or herbaceous marsh.

Basin mangrove: Surface hydrology is often characterised by sluggish laminar water flows over wide areas of very small topographic gradients. The water turnover rate is slow, with basins receiving and storing water seasonally (Cintrôn and Schaeffer-Novelli 1982). Substrates consist primarily of mud, peat, marl or sandy loam (Furley and Ratter 1992). Basin communities develop in a wide range of physiographic environments, and because of resulting variations in salinity, hydrology and nutrient availability, the composition and structure of the sub-communities which develop are very varied (Snedaker, pers. comm. 1992).

The relatively high water levels associated with basin mangroves necessitate comprehensive drainage and raising of land levels when cleared for other uses. Dredge and fill techniques simultaneously achieve both and are therefore widely used in the conversion of basin mangrove. The other common, if less drastic, change to which basin mangroves are often subjected, is the interruption or alteration of surface drainage off-site. This, in turn, affects nutrient inputs/exports and water residency periods (changing salinity and dissolved oxygen levels), which in turn can alter mangrove productivity, and cause mass mortality of mangroves within the basin.

Figure 22 Mangrove sub-community types in Belize



Key: Rm = *Rhizophora mangle*, Ag = *Avicennia germinans*, Lr = *Laguncularia racemosa* and *Ce* = *Conocarpus erectus*

Tidal flats mangroves: These cover extensive areas in Belize, on Ambergris Caye and northwards of Little Rocky Point, to the Rio Hondo. They coincide with a geomorphologically distinct coastal region, consisting of a plateau of shallow recent calcareous marl with mud, over Pleistocene limestone. They lie within the driest region of the mainland, and lack ingress of freshwater from major rivers. Consequently, these coastal flats are highly saline (Davis 1943, Hartshorn 1984). High evapotranspiration and wind desiccation compound the physiological dryness of this environment. The mangrove sub-communities here are therefore sparse with low biomass and are only intermittently inundated, during extreme tides and/or storm surges. The configuration of the coastline is such that winds from the south and east raise flooding in and around Shipstern and other coastal lagoons (Meerman pers. comm. 1992).

Human disturbance of these areas is unlikely as they form the least populated part of the coast, devoid of any permanent settlement. The only foreseeable types of development are aquaculture and holiday homes along the coast. Both would require the construction of raised areas, for pond walls and beach construction respectively. Whilst economically marginal, this does not rule out their development - Belize is littered with failed projects of this kind. In both cases, construction would interfere with surface water drainage which may lead to localised changes in the salinity regime lethal to the mangroves present.

Overwash mangroves: Overwash mangroves are basically forests growing on permanently submerged land with no high ground. These 'marine' mangroves are of greatest probable importance for any fisheries productivity, as they are generally more immediately adjacent to seagrass and coral habitats, where the majority of commercial fishing takes place. Secondly, the substrate of overwash islands is extremely poorly consolidated, and therefore their removal has a rapid and significant impact on rates of wave erosion. This is especially the case where the cayes are small. Since overwash sites are also in the forefront of storm and hurricane impacts, clearance can cause catastrophic erosion and loss of cayes in major storms.

Fringing mangroves: These develop in conditions of permanent inundation, along Belize's protected shores, adjacent to the sea or lagoons, and circumscribing large islands (Thom 1984). In all cases, *R. mangle* is the dominant species. Due to the limited tidal range of the Caribbean, fringing mangroves occur in relatively narrow belts (obviously depending on topography), with observations revealing a range of between 2m wide around lagoons, to approximately 60m wide on prograding shores with shallow gradients. These mangroves are significant for their direct physical role in shoreline protection and sediment trapping, their biological role as fisheries nursery, wildlife habitat and source of detrital matter, and their biochemical role in nutrient take-up. The balance of these depends on the exact location of the particular fringing mangrove, but clearance reduces the contributions of all the above to some degree or other. Nonetheless, fringing mangroves are the obvious candidates for clearance, to increase breezes inshore, to give cooler conditions, reduce the annoyance from mosquitoes and sandflies, to improve boat access as well as coastal views.

Riverine mangrove forests: These are generally productive, nutrient-rich environments which receive a substantial input of nutrients from the watersheds of the rivers along which they grow. These forests range from approximately 6m to a maximum recorded to date of

approximately 30m along sections of the Temash River (Furley and Ratter 1992). Again because of the high level of inundation, *R. mangle* is the dominant species, and is usually found in narrow mono-specific stands paralleling rivers and creeks. Herb and algal growth tends to be limited because of the dense shade cast by the thick canopy. Vegetation landward of riverine mangroves varies according to local topography. Examples include freshwater marsh, swamp forest, basin mangroves, and savanna. The impacts of clearing riverine mangroves are similar to those for fringing mangroves.

Having identified the nature of Belize's mangroves, and their important physical and ecological features, the chapter concludes by assessing the requirements for sustainable exploitation. This allows the analysis of exploitation trends revealed in the following chapters to be compared to a sustainable type of use.

Section 3.3 Requirements for Sustainable Mangrove Management

As the ecological and physical benefits of mangroves have become more widely known, wetland scientists have sought to establish guidelines by which to promote the sustainable development of mangroves (e.g. Hamilton and Snedaker 1984). Out of these, it is possible to define the basic components of a sustainable mangrove management strategy, that would take into consideration the characteristics of the mangroves found in Belize. Such a strategy would be constructed around the following principles, drawn together from mangrove management strategies already in existence elsewhere (e.g. Saenger *et al.* 1983, FAO 1994):-

- Protection of the food web on which commercial and recreational fisheries depend
- Protect mangroves that are important for the health of associated reef and sea grass habitat
- Maximisation of recreational and eco-tourism opportunities (bird watching, fishing, snorkelling) and preservation of aesthetic qualities
- Preservation of areas used by species of conservation importance (notably Wood Stork and Reddish Egret nesting sites, and mangrove areas used by the West Indian Manatee), plus sufficient habitat to support representative assemblages of mangrove fauna and flora
- Retain mangrove along coastlines and riverbanks to help minimise erosion and storm damage (especially on small cayes where clearance may chronically threaten the caye's stability)
- Maintain mangrove buffers to reduce hurricane impacts on populated areas

- Protect riverine mangroves to help stabilise banks, thereby maintaining navigation channels
- Use mangroves to enhance water quality by the biofiltration of sewage, industrial and agro-chemical effluent and trapping of suspended sediment
- Ensure the harvesting of mangrove products are within maximum sustainable yields (e.g. pole wood and fuel wood)
- Maximise the benefits provided by mangrove through integrated multiple use, by fostering sectoral co-operation
- Set aside mangroves for research and education purposes.

These list of standard guidelines would be expected to form the basis of a sustainable exploitation strategy. As a result, particular emphasis would be placed on protecting the cayes near to reefs, on protecting estuarine mangroves because of their high productivity, and those supporting rare species. In addition, mangroves around low lying coastal settlements would be retained for hurricane protection, as would those which could usefully serve an effluent treatment role. These are the basic criteria for a sustainable *pattern* of mangrove exploitation. In relation to its implementation, the socio-political tenets of sustainable development demand that planning and decision-making *processes* of mangrove management are open and democratic way and enable grassroots participation.

This chapter has identified the characteristics of mangroves in Belize, the facets which endow mangroves with a resource value, and the basis on which these could be utilised in accordance with sustainable development ideology. The environmental importance of the mangrove zone has been illustrated, revealing a major but potentially vulnerable resource. Chapter 4 now examines how sustainable mangrove development ideology has found expression in Belize in the emergence of policies, structures and stakeholders over the study period. It also identifies the competing influences that simultaneously affected Belize's development trajectory. In both cases, evaluation of the role of elites is begun.

Responses of Belize's Political Elite to Conservation and Development Pressures

4

The previous chapter identified the resource characteristics of Belize's mangroves and assessed the principles to be followed for their sustainable exploitation. This chapter identifies the stakeholders promoting sustainable mangrove exploitation and analyses the political elite's response to their lobbying. It highlights the main measure taken by this elite, which, at face value, represents their acceptance of sustainable management objectives. The degree to which this is actually the case will be examined in the following chapters. Prior to this, the other development pressures simultaneously influencing the ruling elite are examined. Economic diversification is revealed as the dominant strategy guiding Belize's development trajectory, the leading sectors amongst which are agro-industrial exports, aquaculture and tourism.

The ruling elite operate in a mediating position between the tensions between these two development approaches. Analysis of their influence in resolving these conflicts enables their true response to sustainable mangrove exploitation to be identified. As a preliminary step to this analysis however, a brief introduction to the political situation in Belize is required to put this mediating process in its context.

4.1 The Significant Characteristics of Belize's Political System

The political landscape that has developed in Belize is sharply divided down party-political lines. The resulting ubiquitous bi-partisan division suffuses most aspects of development. As shall be seen, such divisions are highly significant to the understanding of mangrove exploitation [1].

The two main parties that have dominated government since Independence are the People's United Party (PUP) and the United Democratic Party (UDP). The PUP was founded in 1950, and governed from the introduction of self-rule in 1964 until 1984. Following its long period in opposition, having coming in to being in 1973, the UDP first achieved office

[1] For comprehensive details of party development, see Assad Shoman's (1987) book 'Party Politics in Belize'. Additional perspectives on Belize's political structures are provides by Bolland (1991) and Hanson (1974).

during 1984 to 1989. Disillusioned by corruption and the apparent 'selling out' of Belizean interests to foreigners, voters returned the PUP to power in the 1989 election. In 1993, after calling an early election, the PUP lost however, principally because of public disquiet about corruption. Whilst the UDP returned to power, they are already expected to be voted out of power at the end of their five year term (1998), because of public concern over corruption and the austerity of economic reforms they have imposed.

Throughout this period, the Forest Department (FD) has been responsible for conservation matters, including mangroves. Until 1984, it was within the Ministry of Natural Resources. With the UDP take-over, the FD was transferred to the Ministry of Agriculture, Forestry and Fisheries during 1984-89. When the PUP returned in 1989, it was transferred back to Natural Resources, where it has remained.

4.2 Conservationists' Call for Sustainable Mangrove Exploitation and the Political Elite's Response

4.2.1 The Conservation Nexus - Its Stakeholders and Their Growing Presence In Belize: Independence placed a severe load on the new Belizean government. In response, many Ministers sought outside assistance to carry out their particular portfolios. Indicative of this was the 1982 initiative of Florencio Marin, the PUP's Minister for Natural Resources. He 'expressed an interest in developing a conservation strategy for the country and contacted IUCN for assistance in such a project' (IUCN 1983:4).

In the early 1980s, as already highlighted in Chapter 2, the IUCN and its sister organisation, the WWF, were increasingly prominent protagonists of both sustainable development ideology (e.g. IUCN 1980) and its practice (e.g. Salm and Clark 1984). Through regional initiatives, including Central America and the Caribbean, this ethos was promulgated through a range of projects to assist in strengthening conservation action at the national level. In Belize's case, both the IUCN and WWF were interested in responding to Marin's invitation for several reasons. Although not supporting unusual numbers of endemic species, its biogeographical domain covered the range of Caribbean and Yucatecan endemics, and harboured North, South and Central American wildlife. Furthermore, even with the relatively poor information available at the time, its flora and fauna were more abundant and less threatened elsewhere in the region (Zisman 1989). Belize therefore provided a strategic location with the unique potential to conserve important ecological resources.

It was Belize's coastal resources however, which motivated the conservation interests in obtaining a stake in Belize's development. It has the longest barrier reef in the western hemisphere, in pristine condition at the time, with a variety of other reef formations and the three best developed atolls in the Caribbean (Stoddart 1962). It contained extensive sea grass habitat and 'untouched' mangrove forests. Overall, with its low population and near pristine environment, here was a country where sustainable development really stood a chance (Respondent 23). As one specialist summed up

> 'If it can't be made to work here, it's not going to work anywhere'
> (Respondent 24).

The resulting IUCN mission was assembled to develop a national conservation strategy for Belize. As well as funding from WWF-US, further contributions were made by the US Agency for International Development (USAID). In general terms, this was an example of the increasing aid for conservation. In turn, this had arisen partly at the behest of conservation bodies like IUCN and WWF (e.g. IUCN 1980), as well as in response to growing international concern over environmental degradation in developing countries (e.g. Caufiled 1984, Gradwohl and Greenberg 1988). In the case of Central America, the USA's interest in promoting sustainable development ideology was also spurred by its strategic geo-political, as well as biogeographical position. As the severity of the Central American environmental crisis became known, (e.g. Leonard 1987), a risk was perceived that degradation would exacerbate political instability and civil unrest. Therefore, as a counter measure, the US contributed increasing funds to promoting sustainable development in the region, through USAID. Their interest in Belize was to flag up the benefits of a healthy environment and to prevent degradation taking hold there (USAID 1986). USAID also funded the first assessment of environmental exploitation in Belize shortly after (see Hartshorn 1984). Aid was also provided in the form of as personnel as well as finance. In particular, USAID deployed a number of Peace Corps Volunteers in Belize, a high proportion of whom have been involved in promoting conservation and sustainable development, through education, community development projects based on eco-tourism, and the management of protected areas. Although the significance of their role is difficult to

assess, by the sheer energy of the individuals involved, considerable advances were made in promoting sustainable development ideology at grassroots levels [2].

Whilst USAID's involvement had this additional geo-political motivation, other aid agencies were also taking on sustainable development initiatives. The ODA already had a history of tropical silvicultural and land evaluation work as a result of Britain's colonial interest. By the late 1980s, these were being re-cast in a sustainable development frame. In particular, great emphasis was being placed on physical planning as a vehicle for rational land allocation, in order to prevent inappropriate and environmentally damaging land use (e.g. OFI 1989, King *et al.* 1993) [3]. Increasingly, even the development banks, largely as a result of lobbying from the international conservation NGOs, also adopted environmental elements to their aid portfolio. They too, became somewhat unlikely vectors for transferring sustainable development ideology into host nations' development strategies. Belize was no exception, with the World Bank a key influence towards the end of this study period (discussed in Chapter 7).

There was also one further set of actors in the conservation caucus which had evidently been encouraging the take-up of sustainable development ideology in Belize. In parallel with the growing presence of international conservation NGOs and aid donors, increasing numbers of foreign national conservation NGOs were adding an international dimension to their work. Bird migration in particular, had underscored the necessity of international co-operation in conservation. This was already reflected by the establishment of the country's first conservation NGO, the Belize Audubon Society (BAS). With a number of American expatriates amongst its founding members, it began as a chapter of the Florida Audubon Society (in 1969) and received its current status in 1972. It continued to expand and has become the major indigenous conservation NGO, playing a role in mangrove conservation, as shall be demonstrated. Through a series of independent initiatives, more national (mostly USA) conservation organisations 'arrived' in Belize, seeking projects and partners like the

[2] The impact of this latter influence is more significant because several Peace Corps volunteers have settled in Belize. Many continue the work of promoting sustainable development on property they have bought or involvement in conservation NGOs. One example is the Monkey Bay Wildlife Sanctuary set up by one ex-volunteer, who also successfully lobbied to get adjacent state land designated as a national park.

[3] This spawned land use plans for a series of regions designated as Special Development Areas (SDA). Their analysis is beyond the realms of this research, but nonetheless they still provide further evidence of elites' suppression of sustainable development ideology. Although flawed because of their 'top-down' approach, these plans also failed because the political elite would not be restricted by their 'rational' allocation requirements. For further information on the SDA process, readers are referred to McGill (1994).

BAS. Whilst their objectives focused on wildlife conservation, they were couched in terms of sustainable development to make them more politically acceptable (i.e. development rather than preservation). This strategy was also more appealing to local communities and potential donors, on whom these NGOs also depended. In association with the increasing number of Belizean conservation and development NGOs (mostly funded by USAID), these overseas groups promoted their cause through environmental education, protected area management and community-based conservation. In the coastal realm, of all these, the most significant initial role was played by the New York Zoological Society (NYZS). It worked at a national level, helping to build local capacity for CZM. Others, particularly The Nature Conservancy and the International Tropical Conservation Foundation developed site-specific initiatives, and therefore had more localised impacts.

These were the three sets of organisations, the global conservation NGOs. the aid agencies and foreign wildlife NGOs working overseas, who increasingly sought a stake in Belize's coastal development. From the early 1980s onwards, this conservation nexus worked to lever a series of conservation measures from the political elite. In the following section, the precise relationships and mechanisms through which these responses were achieved are closely examined. The aims are firstly to highlight how the political elite were levered into establishing a framework for sustainable mangrove management. Secondly, it stresses that in this interaction between political elites and conservationists, stakeholders are not simple archetypal agents of their particular sectoral structures, but are far more complex and individualistic actors in the unfolding process of mangrove exploitation. The next section goes on to account for the other pressures on the political elite's choice of development strategy.

4.2.2 A Glimpse of Initial Conservation/Elite Relations: The IUCN's mission to Belize provides a tantalising glimpse into the tensions that this thesis seeks to explore, between those seeking to promote sustainable development and elite groups. However, the episode that resulted in the abandonment of the IUCN's mission in 1983 has proved too distant in time to be accessible to research. All that can be reliably traced is the reference from the team's final report (IUCN 1983), whose recommendations are clearly influenced by the sustainable development thinking of the World Conservation Strategy. That they were unpalatable to Belize's political elites is clearly demonstrated by the report's preface about Belize. 'Though interest for conservation is relatively widespread, there are policy makers

and people connected with financial and economic agencies who do not recognise the economic and political value and significance of conservation which they see as a "non-productive" activity irrelevant to their concerns' (IUCN 1983:4). By the guarded standards of this type of report, this is strong and unequivocal language. Evidently, the political and business elites had felt threatened by the proposed conservation measures and had consequently rejected them out of hand. It has not been possible to ascertain whether this knock-back led to a re-adjustment of conservationists' strategy to gain influence in Belize, or whether this episode was separate from the more recent initiatives that are the main concern of this thesis. However, the process by which conservation bodies engaged Belize's political elite since then has been identified, and represents the evidence of the conservationists' attempt to generate influence over Belize's mangrove exploitation, turning it towards sustainable ends. Two contexts for this were evident, firstly efforts by the conservation stakeholders to get a framework for CZM adopted. Secondly, to get mangrove-specific measures put in force. The interaction between conservationist and the ruling elite are now examined for both of these objectives.

4.2.3 Lobbying for CZM and the Response of the Political Elite: Of the national conservation NGOs expanding their role overseas, as already noted, it was the NYZS that took a formative role in the introduction of Belize over this early period. This influence emerged from the friendship of Archie 'Chuck' Carr III with American expatriate members of the BAS (Respondent 2). The link with the BAS, as well as providing access to local wildlife expertise, allowed the NYZS to operate in tandem with an indigenous organisation and reduce the risk of being rebuffed as a 'neo-imperialist' organisation. Having formed the link, Carr worked with the BAS to highlight the importance of its coast and provide resources for the development of its management. His strategy was to raise the profile of Belize amongst the international conservation community and at the same time, to advance the level of information at his disposal, about the resource. As evidence of this, a paper on the state of Belize's coastal zone was published in the journal *Biological Conservation* (see Perkins and Carr 1985). This was the first international publication highlighting its significance, and it advertised the existence of this conservation 'hot spot' to the global conservation community.

To further this process, and again to counter the risk of being seen as an outside interfering force, the NYZS employed a Belizean conservationist, David Meldrew, a member of BAS,

to collate further resource information and promote CZM. This concept was a framework for implementing sustainable development in one particular region of Belize (Price *et al.* 1991, IUCN 1993).

Continuing his 'internationalisation' strategy, Carr carried on his conservation networking to 'spread the word' about the importance of Belize's 'pristine' coastal resource (pers. obs. 1988). During IUCN's 1988 triennial General Assembly in Costa Rica, at Carr's request, a selection of coastal zone specialists at the assembly were asked to an informal evening meeting to talk through Belize's coastal zone management needs (pers. obs.). In this way, the constituency of conservation stakeholders was being expanded and more resources made available to intervene and pursue conservation objectives. Word was being spread that 'there were exciting conservation opportunities in Belize', and conservation organisations were eager to get involved.

Eight months later, the majority of representatives present at this meeting were invited to San Pedro to attend a Coastal Resources Management Workshop in August 1989, sponsored by NYZS, WWF-US, the US National Parks Service and USAID. As reported in its final recommendations the impetus for this meeting was 'to assure the recognition that careful management is vital to assure the sustainable development of Belize's coastal system' (Anon. 1990:167). As a reflection of the importance of the meeting for conservation interests was the range and seniority of their staff present. Included amongst these were the conservation scientist Jim Barborak, senior international conservation NGO staff (Steve Cornelius, WWF-US Programme Officer for Central America [4], Archie Carr from the international arm of NYZS (re-constituted as Wildlife Conservation International), Danny Elder - Marine Programme Officer for IUCN and John Clark from the US National Park Service), staff from various reserves in the region and Australia's Great Barrier Reef Marine Park Authority, and representatives of USAID. This grouping represented the largest gathering of coastal zone expertise ever to assemble in Belize.

Belize was seen as 'at the crossroads of development', making it 'imperative that a comprehensive coastal resources planning strategy be prepared' (*Ibid*: 2). By assembling

[4] In this same year, at the behest of David Meldrew, Cornelius provided WWF-US funds to produce a rapid mapping of Belize's mangrove habitats (see Gray *et al.* 1990). This and subsequent mapping carried out for this thesis are considered further in Chapter 5.

international and local CZM activists, the workshop's objective was therefore to outline a plan of action for the development of a coastal resource management plan for Belize.

Such a major gathering demanded attention at the political level. The motivations of Dean Lindo, Minister for Agriculture and Fisheries, for attending are clear from the contents of his opening address. He clearly addressed the donor agency representatives when he stresses 'I am aware .... that our ability to manage our coastal resources is limited by the level of our experience, inadequate know-how, insufficient data, insufficient technology, a small-over-burdened cadre of local experts, and indeed insufficient capital' (*Ibid.*:6). Having made his thinly veiled request for funds, Lindo's input ended with a direct challenge. 'You are thus charged with the responsibility of coming up with the right mix of technical and management inputs, and suggested activities which can *possibly* form the foundation of future coastal zone development policy' (*Ibid.*:6) (my emphasis).

Three useful pointers can be drawn from Lindo's comments. Firstly, on the basis of his wish list, CZM appears to be solely dependent on money, information, technology and technicians. Lindo completely ignored any socio-political dimension to the management process. Secondly, any reference to conservation or sustainability is notably absent, a stark omission given the purpose and context of the workshop. Thirdly, Lindo makes absolutely no commitment to adopting any CZM measures. The need for 'the right mix' of measures is underscored, and the inference is made that rejection of recommendations will be because the conservationists have got the balance wrong. Even then the recommendations may only 'possibly' be adopted, and even then, only for the 'foundation of future coastal zone development (note, not management) policy'. The conclusion from these comments is that despite the potential funds (represented by the presence of donor agencies), no significant quarter is given to sustainable development. Essentially, Lindo was saying 'Give me the money, and I'll think about it'. He was encapsulating the reality of the relations between the conservation nexus, and himself, as a representative of the ruling elite. This was a clear reminder that ultimate power for the direction and fulfillment of CZM lay in his hands.

At this point, examination of the conservation/political elite interaction continues with the scrutiny of events leading to a new framework for sustainable mangrove exploitation, the Forests (Protection of Mangroves) Regulations (1989).

4.2.4 The Mangrove Regulations - Personalities and Leverage in Stakeholder Relations: The mangrove regulations (included in Appendix 5) encapsulated the tenets of sustainable utilisation being promoted during the 1980s by international environmental agencies such as WWF, IUCN and UNEP. The fact that legislation was adopted could be interpreted, at face value, as the Belizean government's acceptance of these precepts. Certainly, it significantly altered the framework for mangrove stakeholding, by nationalising development rights, an action justified, according to the regulations preamble, for the common good and to protect the legitimate interests of other stakeholders. The passage of the Regulations represented a political response to environmentalists' lobbying for sustainable mangrove management. The genesis and implementation of these Regulations therefore reflects the interaction between international and local conservation stakeholders (in the form of NGOs) and the ruling elite. To test whether the regulations' passage was a true reflection by these political interests to protect the environment, requires close scrutiny of their evolution and in Chapter 6, their implementation.

Analysis of the process that brought about new this legislation to control mangrove clearance in this way reveals international conservation stakeholders brought to bear leverage that local conservationists were entirely unable to do. It was this leverage, the coincidence of personalities and the timing to coincide with the formulation of other aid projects that resulted in this unprecedented piece of environmental legislation passing into the statute books. Evidence is now examined to reveal how the processes, personalities and differing objectives involved produced a final outcome that fundamentally altered the framework for mangrove exploitation, setting up a mechanism for its sustainable exploitation.

Data sources: Information on the genesis of the regulations was obtained through contact with the person who was Chief Forest Officer (CFO) at that time, and correspondence with the tropical forestry specialist responsible for their drafting, Dr. Donald Murray. His role, in particular, will be considered in detail below, because he was evidently a key player in their formulation and representative of international conservation stakeholders.

The emergence of concern over unsustainable mangrove exploitation: The BAS were the first to actively raise awareness of the wildlife and ecological importance of mangroves, dating back to the 1970s when one of its monthly membership talks were given on the

subject (Lydia Waight pers. comm. 1995). During the 1980s, the growing concern over mangrove damage was reflected in efforts to reach a wider audience, and various media were used to promote their conservation, including a schools slide pack and education booklet 'Can something so smelly be so good?'. Talks were also hosted by the BAS, for example by Dr. Victor Gonzalez (President) on the 'importance of mangrove' in July 1988 (BAS 1988a). The mangrove situation perhaps received greater attention because Belize City, located on a mangrove delta, was home to the BAS and the great majority of its board members (Respondent 3).

Foreign concern specifically related to mangroves emerged as an issue during the early-1980s when a visiting USAID mission of resource advisors began to raise it (see Hartshorn 1984:58-59). Concern almost entirely related to the situation around Belize City. By its obvious visibility, it led to an exaggerated perception of the threat to mangroves nationally. This was particularly the case for natural resource advisors for whom the City was often the only part of the coast visited (typifying the type of 'development tourism' described by Chambers 1983). For these reasons, clearance there prompted calls for national action to protect the apparently vanishing mangroves (e.g. Hartshorn 1984). Concern over unsustainable mangrove exploitation focused on three issues. Firstly, and most frequently, there was concern over the increasing vulnerability of Belize City to storm damage, brought about by clearance of the mangrove forests that provided natural storm buffers. Secondly, it was feared that increasing clearance and filling of mangroves, particularly on the cayes, would have detrimental impact on fisheries productivity. Thirdly, conservationists highlighted the threat to wildlife from mangrove clearance, specifically for certain types of herons, egrets and spoonbills.

The new mangrove regulations - ruling elite accede to conservationists' demands? In early 1988, a consortium of US conservation NGOs was put together a bid to buy a large tract of Belizean forest to be managed for conservation. Dr. Donald Murray, one of those involved in this project, was introduced to Lindo following a talk on forest policy to a Belizean consulate. The result was 'Over drinks in a Washington D.C. restaurant in 1987, Lindo asked me to be his 'personal advisor' on forestry and conservation' (Murray, pers. comm. 1996).

Lindo, whose law firm worked to secure the land deal for the conservation consortium (LSD records), was responsible for passing into law a piece of legislation that created an unprecedented framework for sustainable mangrove exploitation. The interaction between these two individuals, and the circumstances of their relationship, is therefore the most significant piece of evidence for assessing the conservation/elite interaction.

Helping to set up Programme for Belize (PfB), the conservation NGO created locally to manage this forest area (which includes unique inland mangrove habitats), Murray spent time in Belize and became concerned at the scale of mangrove clearance in evidence around Belize City (Murray, pers. comm. 1996). This view was shared with the indigenous conservation community, still solely comprising the BAS. The BAS/NYZS employee, David Meldrew was at the time, actively involved in trying to raise the profile of the mangrove issue. Murray's role, as he explained to a meeting with the BAS Board of Directors, was that 'as part of PfB's activities, he was serving as a consultant to the Forest Department, working on forestry and conservation policy and advising the Minister on related issues' (BAS 1988b:6). Between the PfB and BAS, there was clearly a consensus and a certain inter-dependency. PfB wanted to broaden its base of support and needed local links to counter neo-imperialist accusations. The BAS needed resources and partners to help get a government response to the mangrove issue.

The visit of a key group of foreign natural resource specialists at this time added further impetus to the momentum generated by Murray and the BAS. Following a request from GOB in November 1987, these forestry and land use advisors (funded by ODA, USAID, CIDA and FAO) arrived in May 1988 to start formulating Belize's TFAP (OFI 1989 p. 93) [5]. The resulting Sector Review, carried out following their May - June visits, was the most comprehensive examination of the forestry sector since the mid-1950s. As Minister with responsibility for forestry and land use, Lindo was directly involved in the negotiation with the mission's members about translating the Review's findings into aid projects. In order to boost the resources available to his Ministry, Lindo was prepared to request assistance from donors to fund natural resource projects, and this mission provided an opportunity to do so. Furthermore, these were major donors, with the potential to provide large grants. The TFAP resources were likely to be several million (ultimately £4.05 million).

[5] The TFAP was aimed at promoting the sustainable use of tropical forests around the world (including mangroves). For the background and more detailed objectives of this initiative see WRI (1985) and FAO/UNDP/WB/WRI (1987).

In the meantime, no doubt re-enforcing their impressions formed from observing the widespread mangrove clearance around the City, the TFAP team reported perceived threats 'arising from building and related developments in the coastal region, as well as from uncontrolled' mangrove clearance (*Ibid.* p. 93). Re-stating the concerns of the BAS and Murray, they concluded that the formulation of regulations 'particularly urgent' (*Ibid.* p. 140). The mission's recommendation had been very firm, and the potential for considerable technical aid was evident to Lindo. The BAS, a well established NGO, was continually lobbying for action. Murray was on hand for technical advice. At this point, the constellation of issues, activists, personalities and decision makers and donor leverage had come into alignment for the regulations to emerge.

When asked about their appearance, the CFO at the time describes how, at the behest of the BAS, he suggested the need for some form of control to Murray, recommending regulations as the quickest and shortest route to mangrove protection (Rosado, pers. comm. 1996). Murray, primed with this information, recalls how 'One evening in Belmopan, Lindo asked me if I could have the legislation ready for him the next morning, to present to the legislature' (Murray, pers. comm. 1996). Staying up all night to search his files for legislation from elsewhere on which to model Belize's regulations, he came up with a combination of US, Costa Rican, Filipino and Panama (Murray, pers. comm. 1996, Rosado pers. comm. 1996). 'A few days later it was law' (Murray, pers. comm. 1996) [6]. In this relatively short period, mangroves had been rapidly incorporated into the state apparatus for control of resource exploitation, bringing roughly 780 square kilometres (3.4% of Belize's land area) under direct control of the CFO. By the July issue of its newsletter (BAS 1989 p. 3) the BAS 'congratulates the Hon. Dean Lindo, Minister of Agriculture, Forestry and Fisheries, for his strong stance in support of conservation .... The Society especially fully supports the Minister's prompt action in dealing with the mangrove clearing which is occurring at an alarming rate in our coastal areas' [7].

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[6] The regulations were prepared, and, under Section 5 of the Forest Act (1958), approved by the Minister on the 28th February 1989, gazetted shortly after on the 6th May by Statutory Instrument No. 52 (the Regulations are included in Appendix 5).

[7] This article also suggests the permit procedure was originally viewed by the BAS as something of an interim measure, until a protected area was established that included a large mangrove area. It says 'It is vital that this extremely critical habitat be granted some legal protection ... By introducing a requirement for a permit for mangrove cutting, any harmful effects can be minimised and controlled until such time as the necessary legislation is in place'. In a later issue, an article in a subsequent newsletter (BAS 1988c, p. 3) reported that 'Several months ago, the Minister placed an injunction against the cutting of mangroves without permission. This is one step taken towards protection of our valuable mangrove resource and the Society looks forward to the development and introduction of legislation governing the use of mangroves'. The measure for which the BAS were referring was the designation of the Burdon Canal Nature Reserve, designated in 1992 (see Chapter 5).

The introduction of these regulations clearly appears to have been precipitated by lobbying from the BAS, the 'watchdog of conservation' to use Rosado's term. However, it was the timely appearance of the TFAP team, and the long-term presence and skills of Murray that were more significant. In particular, whilst the average stay of the TFAP team members was only 28 days, it was the rapport that developed between Murray and the Minister over a period of months that was the key ingredient leading to regulations' passage. Evidence for this comes from Rosado's comments, when he explained that Murray was 'well liked by the Minister', was a 'very strong advisor' and was 'well in with the Minister. That's how it came about' (Rosado, pers. Comm. 1996).

BAS/Murray and PfB: By working in tandem with the BAS, PfB had taken steps to dilute accusations of neo-colonialism. In return, the BAS, was helped by this external stakeholder to achieved its mangrove objectives. Acting independently, these local conservation stakeholders did not have the power or leverage to wield such influence. This point is perfectly illustrated by correspondence in the FD files from the WWF-US President, in relation to an inland reserve known as the Cockscomb Basin Wildlife Sanctuary. Talking about Florencio Marin, she writes 'The Minister asked me what else he could do for conservation, so I told him the extension of Cockscomb'. This is precisely what he did, and the sanctuary boundaries were extended in 1990. The Minister could of course had the same advice from his own Forest Department or the BAS. From their newsletters, they had clearly been campaigning since the mid-1980s for the same designation.

Murray/Lindo: In achieving Ministerial access with such ultimate affect, Murray showed characteristics of a typical member of the technical elite. PfB, through Murray, has successfully achieved their main objective (the establishment of a substantial conservation estate), but also contributed in this *ad hoc* way, to the protection of mangroves. The Minister, by responding with an environmental gesture, secured from PfB individual kudos, overseas trips (to the UK for example), plus the more general benefits to his party, that these external bodies can provide [8].

Lindo/TFAP: In addition, in order to secure the large resources of capital and technical assistance offered by the TFAP, the Minister, the key member of the political elite involved,

[8] Sub-division and aliens land holding records show that his law firm, Lindo, Barrow and Williams, was retained by PfB to administer the land deal. However, as former owners of the parcels also used this firm, it made sense for PfB to do the same as they had the neccessary background documents. PfB's use of the Lindo's firm should not therefore be interpreted as a 'pay-off' by PfB to secure his support.

had to co-operate. His gesture of legislating for mangrove protection was a timely signal to ODA, USAID and FAO that Belize was committed to protecting the environment. The key point is that the instigation of legislation had zero immediate political opportunity cost. Lindo must have been aware, having overseen the FD for four years, that it was in no position to enforce the regulations, and they were therefore unlikely to inhibit development in any way. His action had helped secure considerable overseas aid without making any firm commitments or capacity to enforce the legislation.

Further evidence of the importance of the TFAP mission is the choice of the FD as host institution for the legislation. Lindo had under his control the Fisheries Department, a competently run institution with the infrastructure and expertise for mangrove management already in place. However, the TFAP mission was more strongly allied to the FD. The TFAP team, having raised the mangrove issue in their report, acknowledged the regulations' preparations (OFI 1989, p.93). Clearly, as they were already willing to allocate funding for mangrove management, the decision by Lindo to run the legislation through the FD is therefore a response to the ODA as external stakeholder.

The battle apparently won: On the surface, a representative of the international conservation nexus had been successful. New, powerful and comprehensive regulations, with far reaching consequences for the sustainable development of mangroves were on the statute books. In addition, the ground work had been laid by the ruling elite to secure major funding to assist with the instigation of sustainable development and resource exploitation. This brings the analysis to its first threshold. The conservation nexus, through a combination of idiosyncratic influences and stakeholder interactions, had failed to gain commitment to CZM but had secured a ground-breaking piece of legislation that set up the framework for sustainable mangrove management. In Chapter 5, 6 and 7, evidence for the degree to which this actually represented an acceptance by Belize's elite is examined.

However, before this, a radical shift of focus is first required, to take into account the wider set of objectives and influences influencing the political elite's choice of development path for Belize, up to and including for the study period. This juxtaposition of development influences is undertaken so that the mangrove exploitation revealed in the next chapter can be assessed against each development agenda.

4.3 Diversification for Development - A Conflicting Trajectory to Sustainable Development

4.3.1 Under-developed Colonial 'dead end': Bolland (1988) describes in some detail the historical economic processes which framed the pre-war era of Belizean development. What is important to note is the very low level that subsequent growth had to build on. Huxley, for instance, after visiting the country in the 1930's, made the apposite comment that 'if the world had ends, British Honduras would be one of them' (Huxley 1934). It was an extremely quiet backwater of the British Empire, with hardly any population and even less development. Over the next 25 years this began to change, but only very slowly. Even by the 1960s, the business climate was described by a prominent local entrepreneur as:- 'Dead! There was absolutely nothing going on, and I mean nothing'. (E. King, pers. comm. 1996). However, from the mid 1960s onwards, the macro-economic influences and range of stakeholders that are currently affecting Belize's coast began to emerge. Firstly, these arose from Belizean efforts to promote development in the lead up to independence. Secondly, they reflect the impact of US economic and foreign policy. The character and impact of these changes are now considered, as the context in which mangrove exploitation has taken place.

4.3.2 The Emergence of Belize's Indigenous Development Ideology: Striving to move the country forward in the lead up to independence, Belize's leaders formulated development philosophy to promote self-reliance and growth. By the late 1960s, and as independence loomed, sugar still accounted for over 60% of export earnings. With the country's over-dependence on agriculture in general, and sugar in particular, the cornerstone of development policy became the promotion of economic diversification (Belize Independence Secretariat 1972).

This development ideology demanded a more pro-active outward looking stance from Belize's politicians and developers. Leaders and entrepreneurs were forced to widen the limits of the national economy to seek more efficient sources of labour, capital, technology and markets. As just one example of this more outward-looking approach is the government's distribution of 25,000 copies of a development promotion brochure to 'investment circles around the world' (Hunter 1968:2). At the time, this represented roughly one brochure for every five Belizeans.

Despite a distaste for American influence by many of the PUP's early leaders (borne out of the desire for meaningful independence), the result was a weakening of ties with Britain and increasing reference to the USA (S. Hunter, pers. comm. 1996). Belize's basic geographical position and its colonial history were increasingly coming to the fore. North America offered a source of investment and potential market of over 300 million Americans and Canadians. Belize also had the advantage over other Latin American and some Caribbean countries of English as a common language. Out of necessity therefore, but still harbouring some reservations, Belizean political leaders increasingly sought US development investment through the 1960s and 70s (Hunter 1968). Helping to overcome any hesitance even at this stage, was a caucus of local entrepreneurs pushing for greater economic opportunities (*Ibid.*).

4.3.3 In Uncle Sam's Backyard - The Increasing Influence of the USA on Belizean Development: It was, however, the unfolding geo-political and economic events of the 1980s in Central America, which also added significant development pressure. Critically, it also made the US increasingly interested in Belize's development trajectory (Vernon 1992). Firstly, and with unfortunate timing, Belize's independence coincided with the world crash in sugar prices in 1981. The balance of payments crisis which ensued forced the PUP government to turn to the International Monetary Fund (IMF) for financial assistance. In return, the IMF required public expenditure cuts and pressured the government to speed up economic diversification. Considerable momentum was added in this way to development based on export-orientated, agro-industrial growth. Stakeholders in this process were a profit-motivated range of external and local business people. Pushing the political elite, this 'commercial nexus' promoted resource conversion, and lobbied for the creation of a more favourable investment climate.

In 1984, as a response to deteriorating economic conditions in the Caribbean, the US offered incentives to promote private sector-led economic growth, stability and diversification in the region (under the Caribbean Basin Initiative, or CBI). This further encouraged Belize to adopt free-market development policy, and the CBI's tenets and market opportunities are reflected in Belize's 1985-1989 Macro-Economic Plan. Written under the PUP, it fell to the UDP to implement its measures. In office for the first time, they took a more vigorous approach to courting foreign investment during their term in office (1985-1989). Nonetheless, with the economy still in difficulties, the UDP was forced to sign an Economic

Stabilisation Agreement with the USAID. Instead of the passive enticement of the CBI, this time the US influence was more direct. The loan was made conditional on a range of further budgetary measures and Belize was required to commit itself to a neo-liberal economic doctrine increasingly prevalent at the time. This gave a vastly increased role of USAID as policy maker for Belize (Vernon 1992) [9]. Belize's development policies were now entirely tuned to private sector growth in an unfettered market driven by international capital.

Within this doctrine, the particular role of the Belizean government was to encourage the expansion and diversification of the economy in partnership with the private sector (USAID 1986). This included a considerable emphasis on infrastructure development, and the period also saw loans negotiated to up-grade highways, airport and port facilities and electricity. As well as USAID, the European Union (EU), the Inter-American Development Bank (IDB), Caribbean Development Bank (CDB), ODA, Commonwealth Development Corporation (CDC) and the World Bank (WB), all party to the same Reagan-Thatcher-Mulroney development doctrine, made loans available for infrastructure development. As just one example of the environmental conflicts this created, the 1992 Air Transportation Master Plan Study, funded by the CDB sought to develop the 21 government-owned airports. To facilitate tourism growth and agro-industrial exports, it recommended the expansion of a number of these, four leading to mangrove clearance.

By the later part of the 1980s, Belize's economy began to improve. The foreign investment overtly courted by the UDP appeared to be paying dividends. Nonetheless, considered excessive by many, it provoked PUP election managers to adopt as their 1989 campaign slogan, 'Elect A Prime Minister, Not A Salesman'. On the back of this national resentment, the PUP won the 1989 election. Once in office, they continued to court foreign investment with equal eagerness up to their defeat in 1993, according to media reports and government promotional material. Both parties had evidently followed a similar approach to diversification, and vigorously embraced neo-liberal dictates, including the pursuit of overseas capital.

Based on the partial success of diversification and the buoyant global economy Belize enjoyed a 'macro-economic turnaround' during the late 1980s to early 90s (Vernon 1992). Compared

[9] Although the absolute size of USAID's funding to Belize appears small in comparison to other recipients, on a per capita basis it was second only to El Salvador during this period.

with 2.5% growth in real GDP between 1985-1986, the average growth between 1987-1990 was almost 11% (World Bank 1996). There was a tangible atmosphere of development during this period, in which the political elite, foreign capital and local producers all were all playing an integral part. This growth manifested itself in several ways, including a wider geographical spread of development around the country [10]. However, most significant in terms of the coast was the rapid expansion of tourism, enjoying a 76% increase in tourist arrivals between 1985-1990. The result was a significant expansion in hotel capacity and support infrastructure. The economic boom also meant that ordinary people had more money to spend, and they were evidently keen to put it into land to build homes. As a consequence, there was a relatively sudden large demand for housing land. As will be shown, both had significant impacts on mangrove. Also, out of all the stakeholders involved, elites were heavily implicated in both.

The emphasis on economic diversification based on a private/public partnership approach has remained central to government policy into the 1990's. Following its return to power in 1993, the UDP instigated several revisions of the Investment Code which granted more and more concessions to overseas investors. Voicing the view of Belize's growing business sector, Paredez (1993:27-28), of the Chamber of Commerce, also notes that, with increasing liberalisation and the erosion of preferential markets for sugar and bananas on the horizon, 'to survive in the new and highly competitive world economy, Belize will have to enter into an aggressive process of economic diversification' beyond that already achieved. The creation of Export Processing Zones in Corozal and Belize Districts represented just one recent attempt to diversify through manufacturing. As a direct manifestation of the free trade ideology filtering down to effect resource exploitation at ground level, it is of note that the Corozal site is partially located in mangroves and other wetlands.

In summary then, these have been the formative influences on contemporary development ideology and practice in Belize. Of particular relevance for this thesis is the role of outside agencies, investors and the ruling elite in shaping these development characteristics. Of particular note, is the increased influence of the US in the political ecology of Belize's natural resource use. This has encompassed two conflicting trends, of US-motivated

[10] According to Respondent 14, the construction boom that was a very tangible manifestation of this growth arose, to a significant degree, from the laundering of drug money. The US was taking an increasingly direct role in Belize's drug enforcement at this time, including pursuit of known Belizean middle-men and the spraying of marijuana fields. It is therefore possible that this explanation is valid. However, because of its sensitive nature, this stakeholder interest could not be explored further.

mangrove conservation on one hand, and mangrove conversion on the other. The precise outcome of these on the exploitation of mangrove resources will be closely examined in the following chapter.

The response of Belize's ruling elite to the conservation-orientated interests has also been assessed. Clearly, in passing the mangrove protection regulations, the Minister with responsibility for mangroves established a legal framework for their sustainable use.

It is now necessary to establish the exact nature of mangrove exploitation that has subsequently taken place on the ground, to show the outcome of the competing development influences on Belize's mangrove resources. Once the dominant impacts have been identified, analysis then proceeds with the significance of elite stakeholders in directing this development trajectory over the study period.

Mangrove Exploitation - Characteristics and Sustainability 5

5.1 Introduction to the Analysis of Mangrove Use

Up to this point, the research has characterised Belize's mangrove resources and outlined requirements for their sustainable use. It also identified how environmental stakeholders interacted with the ruling elite, getting regulations passed to enable sustainable mangrove management. The pressures for increasing economic development have also been portrayed. These sought to diversify the economy to generate greater income, for individuals and the country as a whole. This ideology was promoted by different stakeholders.

In the analysis below, the main forms of mangrove exploitation, their sustainability and stakeholders are examined. This work builds up the background knowledge of stakeholders needed to interpret socio-political relations in the following chapters.

Chapter 5 begins with the mapping of mangrove extent, providing information on their distribution and the causes of alteration. This highlights the particular impact of settlements, so their growth and population change are scrutinised, in order to better understand the form and focus of their effect. To pursue this understanding further, extra evidence is required to elicit finer scale data on exploitation characteristics. This makes it feasible to compare the mangrove exploitation actually taking place with that prescribed for sustainable mangrove use. Sources used for this next stage in the analysis are given in Table 5.

Table 5 Data sources used for the analysis of coastal development affecting mangrove use

Description	Purpose	Use in Analysis
Insights from respondents	identify and corroborate stakeholder information	major
Applications to FD to alter mangroves	identify development patterns + stakeholders	major
Applications to LSD to sub-divide land	identify development patterns + stakeholders	major
Applications by foreigners to buy land	identify development patterns + stakeholders	major
Land tax records	corroborate land ownership	moderate
Property surveys	identify location of properties	moderate
GOB census data	identify growth of coastal settlements	moderate
LSD property surveys and compilations	layout, plot size and location of land parcels	moderate
LSD Land Registry	layout, plot size and location of land parcels	moderate
LSD survey job book	identify GOB sub-divisions	moderate
Company registers	company shareholders	moderate

The data used were extracted mainly from FD and LSD development control records. Extensive collation, refinement and checking was required for them to be of use, but did provide a range of relevant insights. The first analysis was of the applications for *permits to alter mangroves*. This provides an insight into the characteristics of mangrove alteration by private developers who are meeting the legal mangrove conservation requirements. As a more widely applicable indicator of development, the second analysis presented evaluates the *sub-division of land parcels* that are in mangrove areas. This gives an indication of the purpose of mangrove exploitation, as the procedure for getting permission to sub-divide property requires a range of development details to be furnished by the applicant. The third insight into mangrove exploitation has been extracted from records of *land bought by foreigners*. Required under law, this information helps to identify a range of additional forms of mangrove use that otherwise would not be revealed by any of the above. Most importantly, this includes land bought by overseas charities for conservation purposes.

In combination, these results elaborate on the political ecology of mangrove exploitation in Belize. They reveal the stakeholders involved and the sustainability of mangrove exploitation taking place. Finally, they help accumulate the knowledge needed in following chapters to establish the actual role of elites in mangrove exploitation, and their choice of more or less sustainable paths for development. Having introduced the analysis included in this chapter, the research assesses mangrove distribution and the characteristics of alteration.

5.2 Mapping Mangrove Distribution and the Extent of Alteration

5.2.1 Mapping Approach and Results: Mangrove mapping was undertaken to identify the degree and distribution of alteration which has taken place. Full details of this work are given in Appendix 6 including the initial foundation completed with co-workers (Gray *et al.* 1990). In summary, Landsat TM satellite imagery, air photo interpretation, over-flights and ground survey were used to map mangrove distribution. The most recent and comprehensive air photo coverage available was for 1990, so figures go up to that year. Ambergris Caye was the only exception, with the most recent coverage available being from 1988 [1]. Consequently, the mapping results are not entirely consistent for the whole country. Additional larger-scale 1992 aerial photographs were interpreted for the Belize City/Ladyville area, enabling more detailed mapping of this important area over the study period. The natural extent of

[1] For the sake of brevity, wherever the 1990 figure is referred to, it is this 1990/1988 data.

mangrove was reconstructed from old air photos and maps. This natural cover, the 1990 and 1992 distributions were transferred onto Arc/Info GIS, for geo-registration and map generation. This also enabled the area cleared to be calculated, up to 1990 for the whole country (except the 1988 limit for Ambergris Caye), and up to 1992 for Belize City/Ladyville.

For mangrove areas not undergoing alteration, Landsat TM imagery was used. Using GIS, it was combined with data from 1:44,000 air photos for the mangrove's being developed (and for parts of the satellite image obscured by cloud). Land cover classes were differentiated according to the mangrove's structural characteristics and to match the types of exploitation taking place. These are listed in Appendix 6.

Mapping results: The combination of Landsat and air photo data revealed that in 1990, mangroves covered approximately 76,924ha, equivalent to 3.4% of the country's land area. A map of mangrove distribution is given in Figure 23. From interpretation of historical sources, the 'natural' mangrove cover for Belize is 79,162ha. Deducting the 1990 mangroves figures, show that 2,239ha had been altered by this stage. This leaves 98.1% intact. Figure 24 shows the breakdown of altered mangrove. Results from the mapping of Belize City/Ladyville up to 1992 show that between 1990 and 1992, a further 537ha were altered in the greater Belize City/Ladyville region, a 0.7% reduction in the national total in just two years.

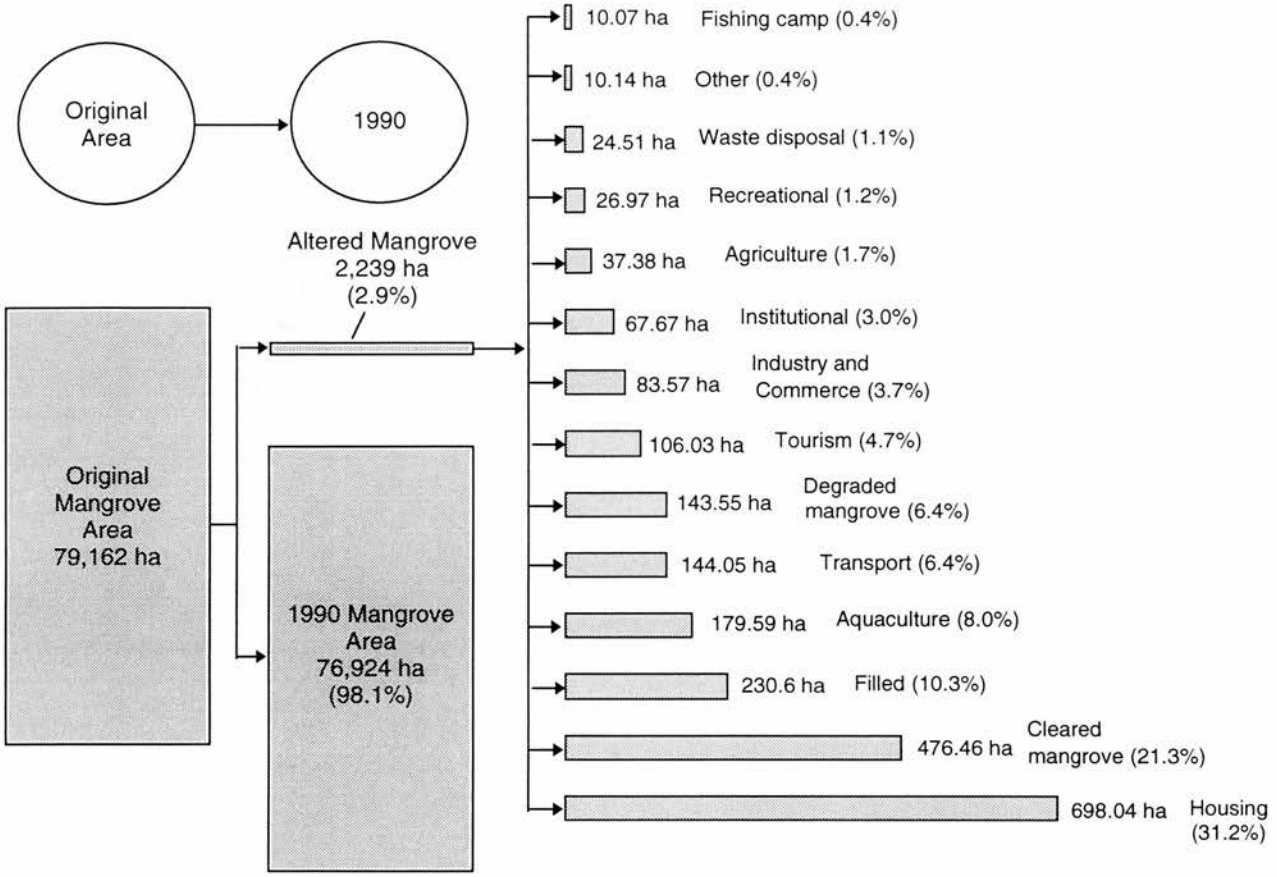
Mapping accuracy: Over two months were spent in the field and over 60 sites were visited, collecting ground truthing information to ensure accurate mapping. In addition, 12 hours flying time enabled the mainland mangrove belt, Turneffe atoll and Ambergris Caye to be comprehensively checked. The main source of residual error arose from the placement of boundaries between mangrove savanna and other savanna types, and in failure of the satellite to detect mangrove growing sparsely in open water. Overall, these checks revealed an accuracy level in the range 85-95%, dependent on the type of community. This falls within the +/- 15% accuracy reported for mangrove mapping in Florida (Myers and Ewel 1990) and was considered acceptable. As one further check, a comparison was made with results from Wright *et al.* (1959) [2]. Their figure for original mangrove was 74,850ha, 5.8% below the one produced here. Overlaying both maps on GIS showed a similar distribution had been obtained, with the difference largely accounted for by Wright's omission of inland mangrove areas and the smaller cayes.

[2] As discussed in Appendix 6, a number of other vegetation mapping projects have included mangrove distribution. For reasons of accuracy, none could be used directly for this thesis, but Wright *et al.* (1959) is the most reliable.

Figure 23 **Mangrove distribution in Belize**

Source: Derived from 1987 Landsat TM data and B/W 1990 air photos (original scale 1:44,000). Compiled using Arc/Info GIS.

Figure 24 **Original and 1990 extent of mangroves in Belize, with breakdown of the purpose of conversion, the area involved and the per cent of the total clearance this represents**



Source: Derived from Landsat TM data and B/W 1990 air photos (scale 1:44,000) with calculations made on Arc/Info GIS

Note: Results include calculations for Ambergris Caye, which was derived from 1988 air photos and therefore is a slight under-estimate of the 1990 levels of alteration.

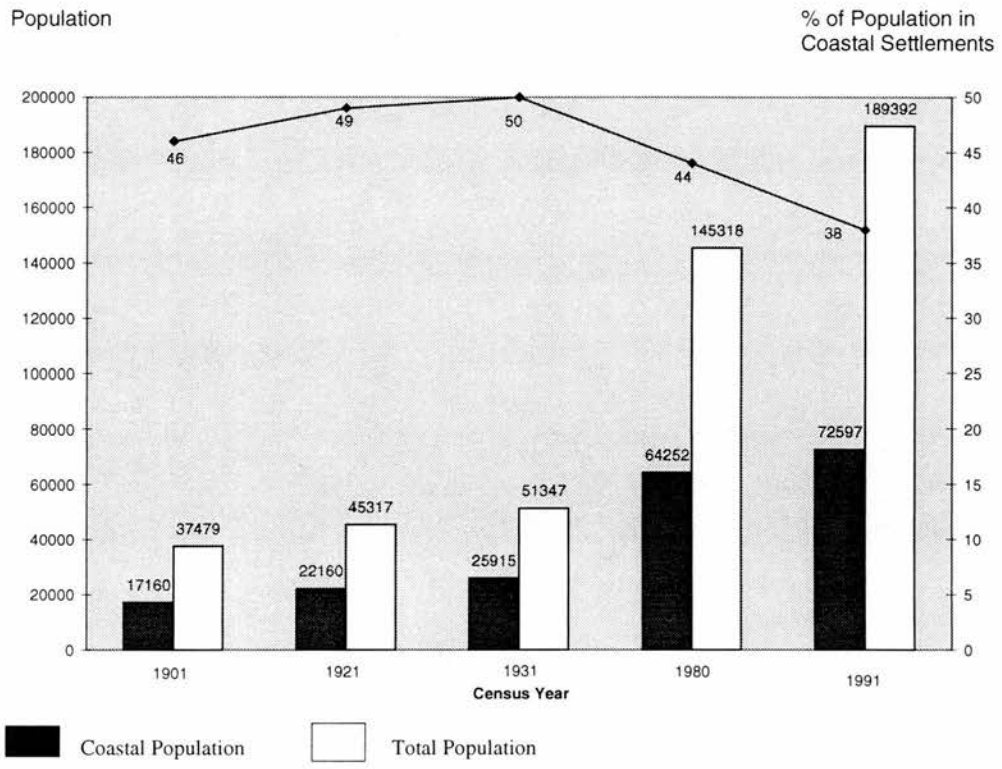
Significance of results: The mapping revealed that mangrove alteration is highly localised, and mostly associated with Belize City. Elsewhere, the majority of exploitation is also from settlements expansion, but on a smaller scale. Aquaculture, transport and tourism are also having a significant impact, with the latter focused on Ambergris Caye and Caye Caulker. From these insights, analysis can be focused on these sectors and areas. To this end, census data are examined in the next section to determine the location, relative size and population growth rates of coastal settlements. Then three larger datasets are analysed to cover the other development types. Overall, the resulting data provided a national overview of exploitation patterns, stakeholders and the types of development involved for this chapter [3].

[3] Equally as important, once these broad characteristics have been securely established, the data are amenable to case-level analysis in the remaining chapters. This helps to illicit evidence at the micro-level, on the socio-political features of stakeholders and elites. However, at this stage, the macro-level evidence from each of the three data sources is most important, allowing the overall patterns of development to be established.

5.3 Settlement and Demographic Pressure in the Coastal Zone

5.3.1 Gross Population Trends in the Coastal Zone: For this analysis, census data from 1980 and 1991 was compiled for coastal zone settlements. This reveals an average increase in coastal population over of 835 people a year over that period (just over 1% per annum). However, with a faster increase in the interior, due to an influx of economic migrants over the same period, and emigration from coastal settlements to the USA, the proportion of Belize's population living in the coastal zone has declined by 0.5% a year over the same inter-census period (Figure 25). Now standing at 38%, it is below most developing countries [4]. The compilation also reveals a relatively low coastal population, amounting to a total of approximately 73,000.

Figure 25 The changing population of Belize's coastal zone 1901-1991



Source: Government archives and CSO (1991)

The actual distribution of Belize's coastal population is highly clustered. The population data reveal a typical 'primate city' and a highly urbanised population. Both are characteristic

[4] The 1991 census is widely considered to have underestimated the population by roughly 20,000. As the majority of these people are thought to be immigrants (obviously wary of census registration), they mostly inhabit the interior. This further decreases the proportion of the population living on the coast.

of the Caribbean (Potter 1993). By far the most important in relation to mangrove impact is Belize City (Figure 26). Home to over 44,000 people (in 1991), it accounts for 61% of the coastal population and 22% of all Belizeans. A further 9% live in five coastal towns, giving a total urban coastal population of 70%. Remaining coastal residents live in 13 villages. The basic characteristics of settlements associated with mangroves are summarised in Table 6.

Figure 26 The location and 1991 population of Belize's coastal settlements

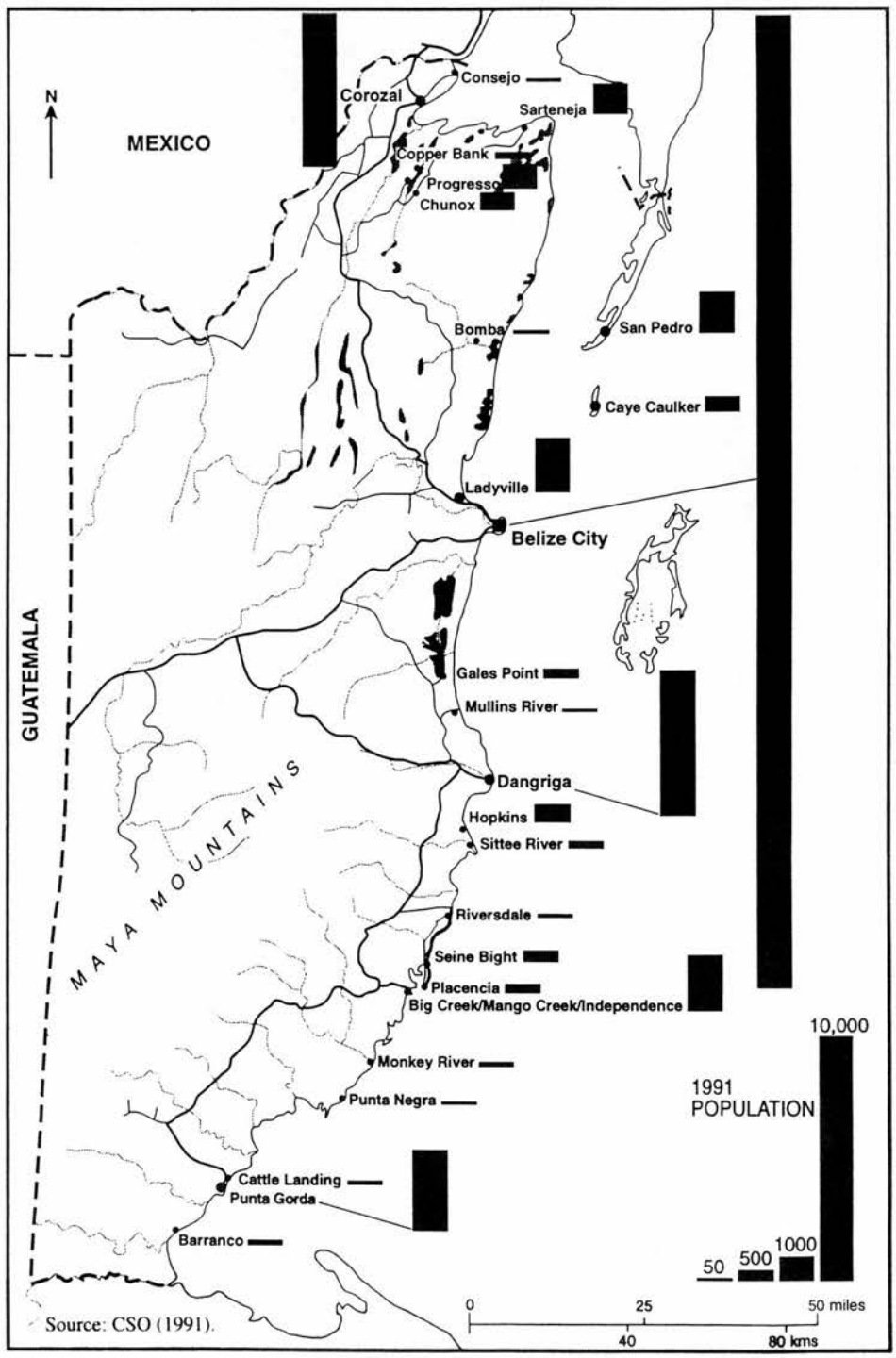


Table 6 Characteristics of Belize's mangrove-associated settlements

Settlement	Pop. Change 1980-91 (%)	Main Activity	Mangrove Use	Physical Setting
Belize City 1	+11	Commercial, industrial and service centre for the nation	Clearance for housing, commerce, industry and city infrastructure. Also used for recreational and subsistence fishing.	The largest mangrove delta in the country, comprising extensive tall, medium and dwarf communities associated with the Belize River mouth and the Haulover Creek.
Ladyville 2	+24	Housing, commerce and industry	Clearance for housing, commerce and industry.	On the northern extremity of the Belize River's flood plain. Tall basin and fringing mangrove forests occur adjacent to the river's lowest reaches.
Dangriga 2	-1	Housing. Regional commercial and service centre	Clearance for housing. Some fuelwood extraction, recreational and subsistence fishing	On the banks, sand ridges and swales associated with the delta of the North Stann Creek River. Littoral forest, mangrove and freshwater swamps occur in this environment.
Punta Gorda 2	+49	As above	Clearance for housing.	Highest shoreline in the country, with a small 'cliff' up to approximately 3m above sea level.
Corozal 2	0	As above	As above	On the mainland seafront, on shallow marl over limestone, ranging from 0-1m above sea level. Mangrove occurs as a discontinuous very narrow fringe and immediately grades into littoral thicket on higher land, and marsh thicket where inland freshwater ponding occurs.
San Pedro 2	+64	Tourism centre for the country. Commercial fishing.	Clearance for housing. Sports, subsistence and recreational fishing. Eco-tourism (bird watching)	High beach ridge (up to 3m approximately) on geologically complex caye, with leeward fringing mangrove and interior littoral and other thicket.
Caye Caulker 3	+58	Tourism and commercial fishing.	Clearance for tourist development and infrastructure.	On storm ridge of sand caye, with fringing mangrove to front and rear, and caye forest and littoral thicket in interior.
Placencia 3	+10	Tourism and commercial fishing	Clearance for tourist development and infrastructure. Boat access.	This is a 19km long sand spit measuring 50 to 400m wide. Its windward side comprises a high sand ridge while the leeward shore is lower and dominated by fringing mangrove.
Hopkins 3	+8	Small fishing village. Low-budget tourism	Subsistence and commercial fishing	Built on a long sandy ridge, extending about 400 yards from the sea inland to the edge of an inland freshwater swamp.
Sarteneja 3	+36	Commercial fishing	Clearance for housing. Subsistence and commercial fishing	As for Corozal
Seine Bight 3	+36	Small fishing village.	Subsistence fishing and fuelwood extraction	As for Placencia
Barranco 3	-20	As above	As above	On small bank about 1.5m above sea level.
Monkey River 3	N/A	As above	As above	As for Mullins River
Mullins River 3	+11	As above	As above	On the coastal berm and river banks, with brackish back-swamps of mangrove.
Gales Point 3	-6	Small fishing village with some low-income tourism	As above with some low-income eco-tourism	Fossil beach ridge forming a sand spit 0-1.5m above sea level approximately, protruding into a brackish lagoon. Lined by ringing mangroves with internal thickets of mangrove and littoral forest.

Source: CSO (1991) for population change data, plus field visits for other information.
1 = City 2 = Town 3 = Village

It is clear from the above analysis that settlement growth is a major influence on mangrove use. Therefore, understanding its exploitation requires land allocation to be examined, especially for housing, in these settlements. Smaller scale impacts are arising from other activities and also need to be investigated. To do so, additional evidence is required which, in turn, demands suitable data. Government records from development control legislation provide the most suitable source available. The following sections use this data to elaborate on the nature of mangrove exploitation, its impact and the stakeholders involved. This is the first time that analysis of these records has been undertaken.

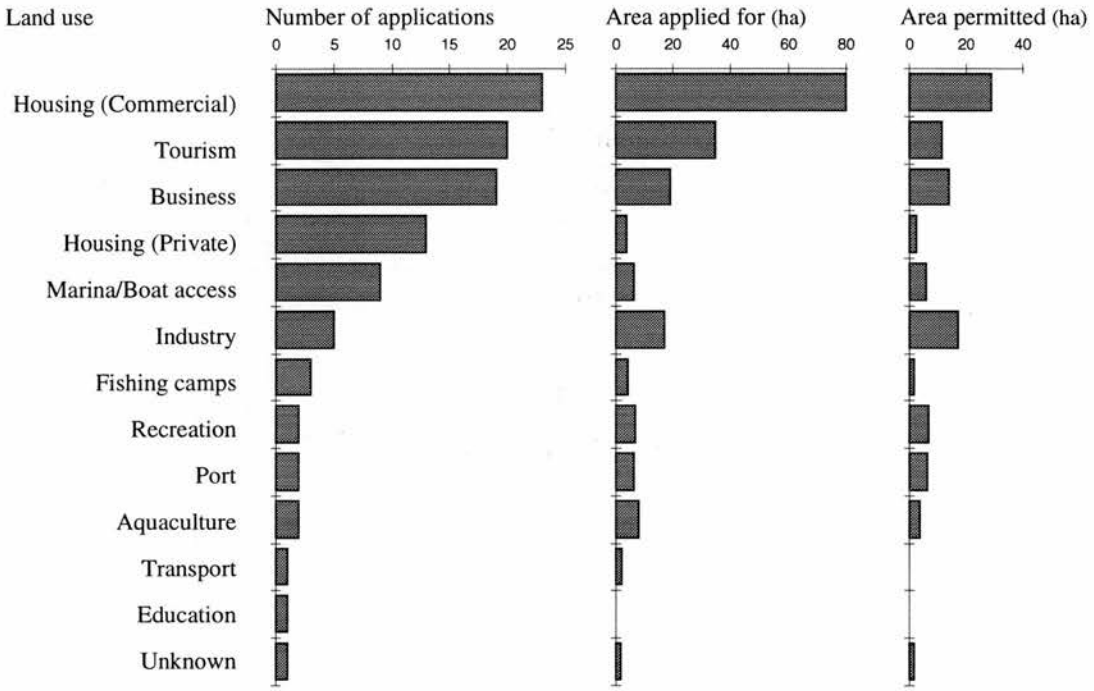
5.4 Insights Into Mangrove Exploitation From the Analysis of Applications to Alter Mangroves

5.4.1 Analytical Considerations and Methodology: As examined in Chapter 4, the Forests (Protection of Mangroves) Regulations were introduced in 1989 to regulate mangrove clearance. They form the principal legal tool for controlling mangrove exploitation in Belize, requiring developers to obtain a FD permit before altering any mangrove. Therefore, by analysing the applications, it is possible to elaborate on the distribution and character of mangrove exploitation and the stakeholders involved. Due to limits on permit requirements however, mangrove trimming (cutting of less than 25% of the branches) and any alteration by government agencies or nationalised utilities are exempted. Analysis of permit applications therefore only reveals the nature of private sector development. What is also clear from a comparison of the permit results, mapping and field observations, is that the majority of mangrove alteration is taking place illegally, i.e. without a permit. Nonetheless, it is still instructive to scrutinise the characteristics of those exploiting mangroves in accordance with the regulations, if for no other reason, than to search for any elite-related difference between those following the procedure and those not.

Methodology: Information was obtained from the FD mangrove files. Details omitted from application forms were obtained from FD staff, the applicant, or from site visits. In total, 86 different applicant and site variables were collected (amounting to 1,760 items of data), providing a detailed site and applicant profile. Useful in its own right, this also allowed cross-verification with other data sets (discussed below). To enable these comparisons, and for quantification and spatial analysis, information was transferred onto database (DBase IV) and Arc/Info GIS. The database structure and summary data set resulting from application analysis are given in Appendix 7.

Results - Permit Distribution and Development Purpose: All 110 applications for mangrove alteration permits were examined, spanning the six years from the introduction of the Regulations (May 1989) to the last time access to records was provided by the FD (July 1995). Of these 110, nine were for mangrove trimming. These were excluded because such alteration does not, in fact, require a permit, and the applications were therefore made in error. The outcomes of the 101 applications left are shown in Figure 27. In total, requests were made to alter 190.5ha of mangrove, or 0.25% of the mangroves remaining in 1990. Trimming applications were made for an additional 8.2ha. This compares to 537ha cleared in the Belize City/Ladyville area over 1990-92 alone.

Figure 27 **Development purpose of 101 applications to alter mangroves by main land use, area applied for and permitted**



As shown by Figure 27, the largest area requested for clearance has been for *commercial housing* (23% of all applications). The second most common purpose for mangrove alteration is for *tourism*, accounting for a further 20%. Below this, applications for *business development* were relatively common, although in general, involved smaller areas. Alterations for private housing (i.e. people building their own homes) accounted for 13% of applications. Again, the size of clearance involved was small. Requests for *boat access or marina construction* was also significant (10% of applications). Ranked below this, but involving a greater area, were the 6% of applications for *industrial developments*. Other

development types were requested but these were limited in number and mangrove area involved. The combination of all housing projects accounted for 36% of applications.

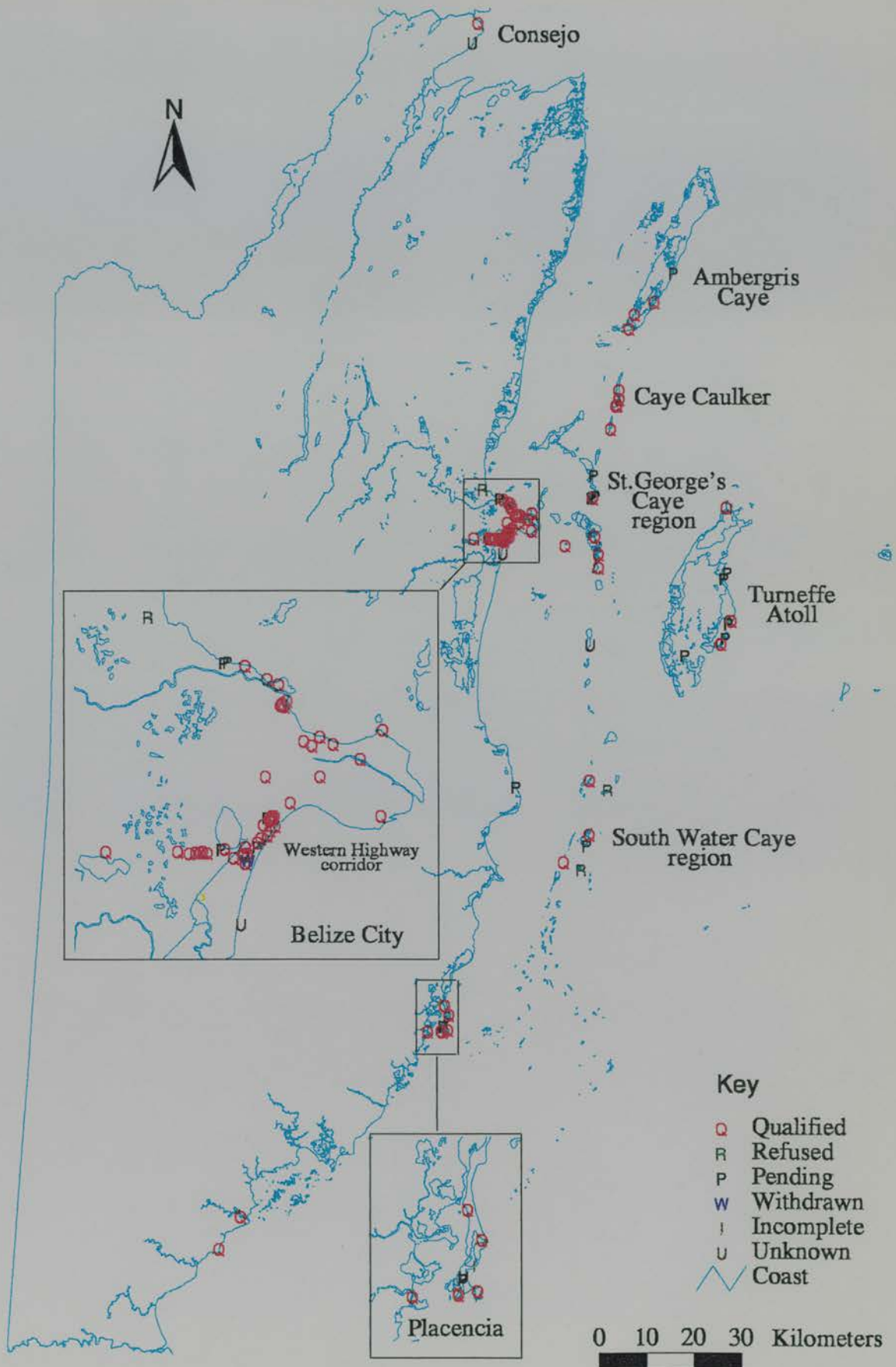
The *range* and *relative proportion* of development types are broadly comparable to the causes of mangrove alteration identified by the mapping. The main anomaly is that aquaculture, responsible for 8% of the clearance, but only 2% of applications.

Turning to the applications' distribution (see Figures 28 and 29), by far the most intense concentration was on the Western Highway, between Mile 4 and Mile 6. Out of all 101 applications, 32% were along this stretch. This reflects patrolling effort. Ribbon development here is on route to Belmopan and is more frequently patrolled by FD staff as they travel between the FD's Belize City office and their Belmopan headquarters. People seen clearing mangrove in this area were confronted and asked to submit applications, if they had not already done so. With the addition of 18 other applications, *Belize City* accounted for 50% of all applications received. Even with the 'patrol bias', this prominence over all other sites still reflects the highest level of mangrove clearance in the country.

Elsewhere, the majority of the remaining permitted mangrove developments are principally in the vicinity of St. George's Caye and Turneffe Atoll, but also in the South Water Caye area, on Caye Caulker and Ambergris Caye. By purpose, these are dominated by clearances either for fishing camps or for tourist developments. For the cluster of permitted mangrove alteration on the lower half of the Placencia peninsula, tourism is the main cause.

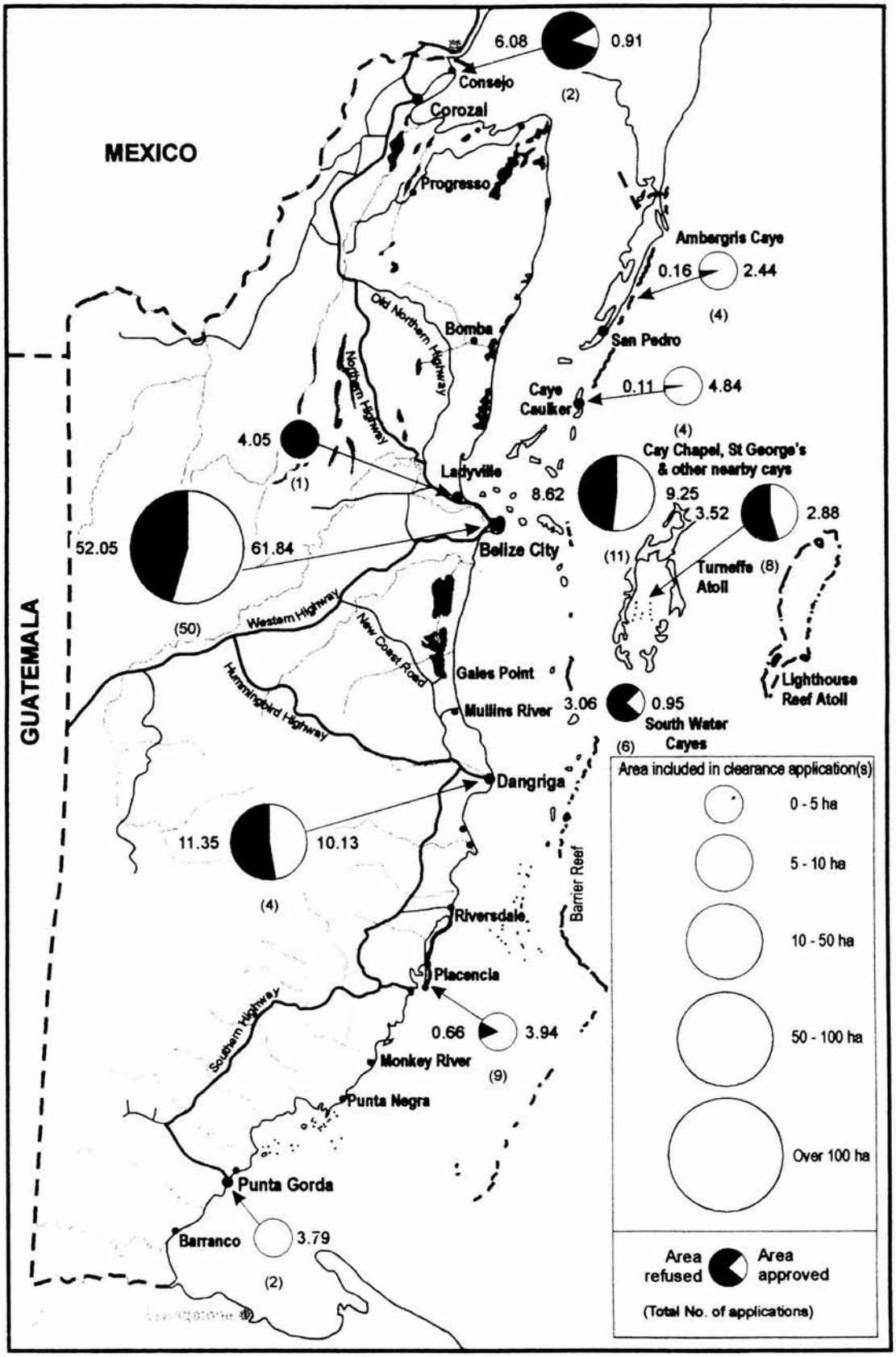
These patterns of mangrove exploitation are environmentally significant for two reasons. Firstly, habitats on the cayes are particularly fragile. Mangrove clearance increases the risk of erosion (and catastrophic physical damage in the event of a hurricane) because of the unstable nature of the substrate. They consist entirely of unconsolidated sand or peat which are highly susceptible to erosion, unlike the mainland, where clays may also be present. (King *et al.* 1993). Secondly, being in closer proximity to sea grass and reef habitats, mangrove's contribution to fisheries productivity is likely to be greater, especially in the case of fringing and overwash mangroves. Thirdly, the wildlife species of conservation concern associated with mangroves (notable water birds and the West Indian Manatee *Trichecus manatus*) are more strongly allied to the mangroves on the cayes rather than the mainland. Therefore, for all these reasons, the alteration evident of the cayes raises concerns over the sustainability of these developments.

Figure 28 **Location and outcome of all the 101 applications for permits to alter mangroves (May 1989-July 1995)**



Source: FD records.

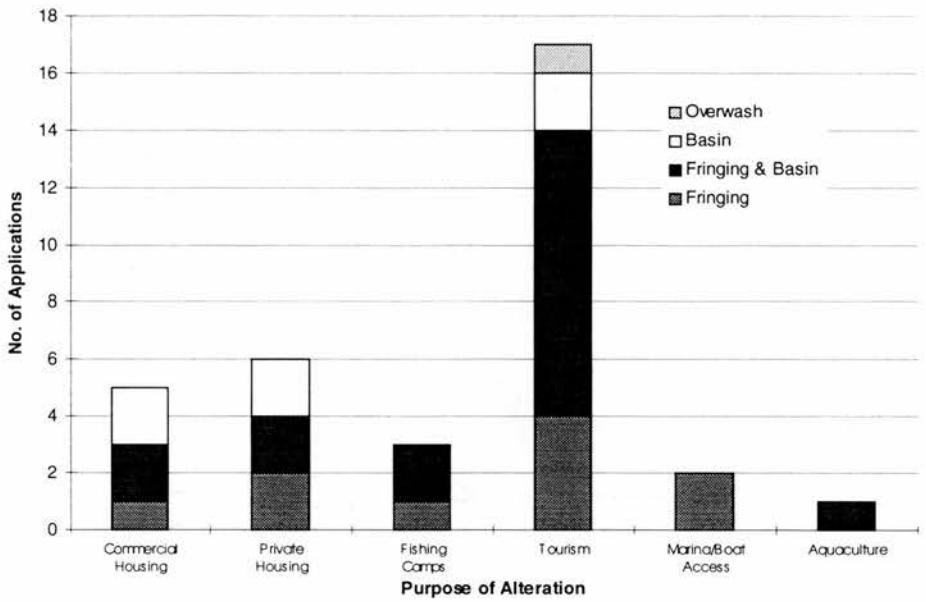
Figure 29 Clearance applications by location, area applied for and permitted



Source: FD records.

Finally, the analysis of the permit applications considered the type of mangroves being altered. This helps to assess the precise impact development is having. For each application, the site's physiographic setting was identified and entered into the permit database. The results, shown in Figure 30, indicate that the majority of applications are mostly affecting fringing mangroves, followed by basin mangroves. Again, this suggests that development is having a particular impact on coastal erosion and fisheries productivity, the two main beneficial functions of fringing mangroves. Whilst the permits seek to mitigate this by specifying that mangrove buffers be retained along shorelines, the demand for mangrove clearance is clearly greatest along the waterfront. This generally contravenes the dictates of sustainable mangrove use.

Figure 30 **Number of permit applications by development purpose and mangrove type affected**



Overall, this analysis provides a further insight into the purpose of mangrove alteration, the distribution of mangrove developments and their impact. As already noted, however, there are limits to its insights because of the low compliance with the permitting procedure. Therefore, whilst making a contribution, further analysis is required to obtain a more comprehensive assessment of coastal development, its stakeholders and sustainability.

5.5 Insights Into Mangrove Exploitation From the Analysis of Land Sub-division and Foreign Land Ownership

5.5.1 The Importance of Land Ownership for Mangrove Exploitation: In their study of Belize's coastal management needs, Price *et al.* (1990) highlight the significance of land ownership as an influence on coastal development. The high priority they give to this is based on the belief that tenure is of fundamental importance to the ultimate use of any particular mangrove area. The distinction between private and state owned land is certainly crucial. Firstly, protected areas, an important element to of the sustainable exploitation of mangroves, can only be designated on national land. Secondly, and more importantly, state-owned land is a key resource of the political elite, for reasons that will be made evident in the following chapter. Also, changes in ownership, whether from state to private, or from one private owner to another, involves new stakeholders and raises the possibility of a change in use. Therefore, the monitoring of land ownership is, as Price *et al.* (1990) suggest, a critical component in understanding the mangrove resource use system. It enables stakeholder and development trends to be identified, often before they manifest themselves on the ground.

In Belize, there are two particular pieces of legislation which enable the investigation of private land ownership and land development in a way appropriate to this research. The first is the Land Utilisation Act (1981), requiring all sub-divisions to be screened and approved by the Lands Utilisation Authority (LUA). The second is the Aliens Land Holding Act (1973), which requires all foreigners to obtain a licence before buying parcels of certain size, in particular areas. Land ownership analysis in developing countries is particularly complex, with important issues of accuracy to cover (Dale and McLaughlin 1988). The analysis of the sub-division and aliens records was therefore lengthy and complex, sifting and verifying records from a range of different sources. Full details of the analytical procedure are given in Appendix 8. In total, 56,000 items of data were collated from government records and entered onto database (DBase IV). For each set of records, the analysis covered the period from the law's introduction to the last major piece of fieldwork based in Belmopan. For the sub-division work this spanned 1986 to 1993 and for the aliens analysis, 1974 to 1993. This collation has generated what is probably the largest ever land-related dataset on Belize's coastal zone assembled to date.

This analysis helped to considerably refine the emerging picture of mangrove exploitation. At an aggregate level, the records provide insights into the land development characteristics, including the location of development, purpose, and impact on mangroves. At the case level, and for the next chapter, applications reveal insights into the individual stakeholders, their characteristics, motivations and interactions.

As will be shown below, the evidence collated reveals that housing, tourism, aquaculture, agro-industry, and conservation are the defining forces behind the political ecology of Belize's mangroves from the late 1980s to early 1990s.

5.5.2 The Sub-division of Coastal Land - Analysis of its Distribution and Development Purpose: Between the introduction of the sub-division system in September 1986 and the end of access to GOB records (December 1993), the LUA received 967 applications for the sub-division of land. Of these, 324 progressed as far as Final Approval [5]. In contrast to the mangrove alteration permit analysis, the sub-division legislation applies to all land, so for this thesis, only the applications affecting coastal and mangrove were examined. Of the 324 sub-divisions that reached Final Approval, 108 (33%) were coastal. Of these, 83 were in mangroves (i.e. 77% of coastal sub-divisions) [6].

In the same way as the mangrove alteration permit analysis, the principal factors to identify from these data are the distribution, development purpose and impacts of sub-divisions.

The distribution of these sub-divisions is shown in Figure 31, and reveals the main cluster of sub-division activity in the Belize City/Ladyville region. Just over 40% of approved sub-divisions were here (31 for Belize, 2 for Ladyville), in comparison to the 50% of mangrove permit applications. As suspected, the 'patrol bias' did exaggerate the alteration taking place, but nonetheless, this area is clearly the national focus of mangrove development.

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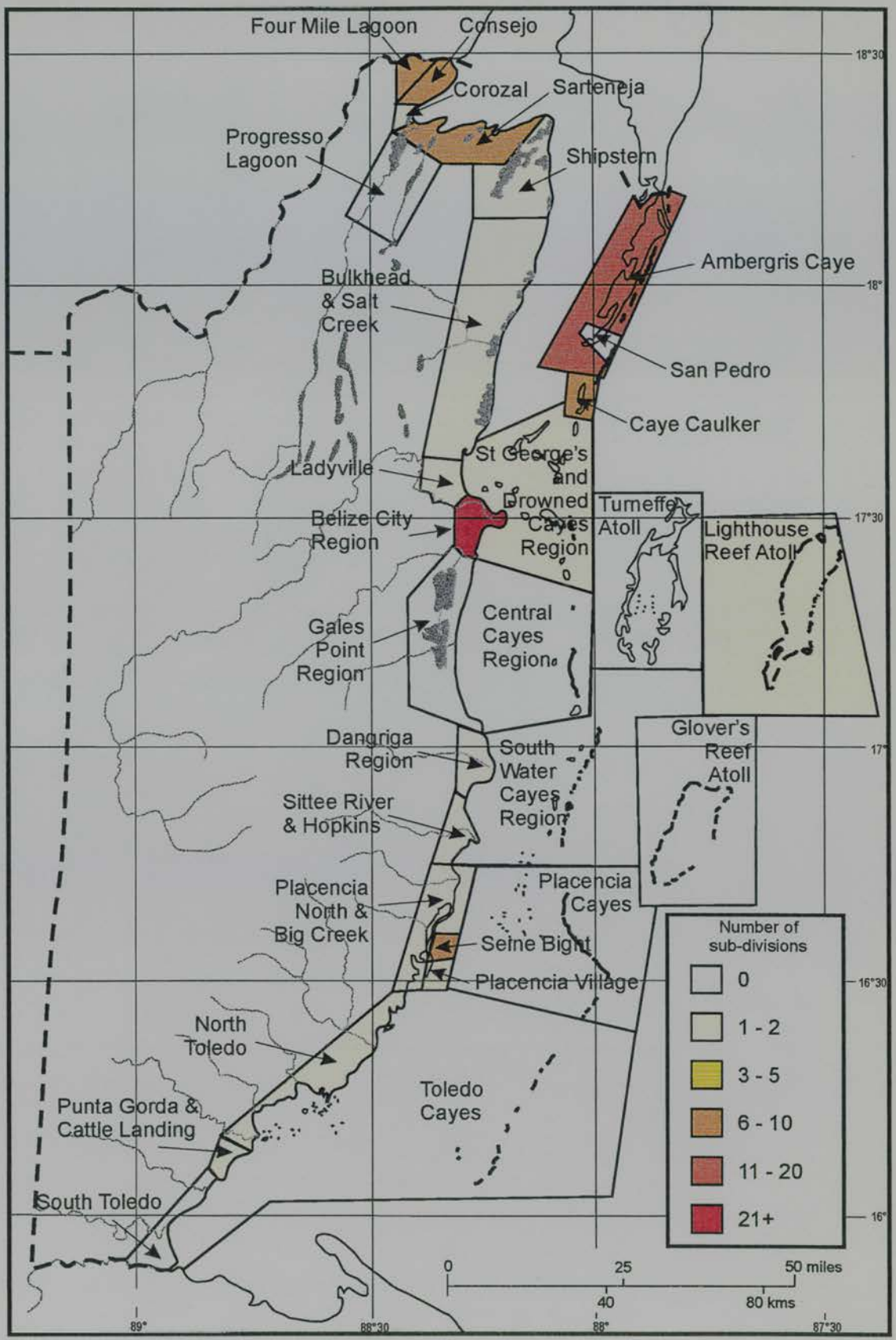
[5] The procedure to sub-divide land requires an applicant to submit a request to the Land Utilisation Authority (LUA). Once the LUA is satisfied that all requirements have been met and that the parcel configuration has been legally surveyed, it recommends to the Minister of Natural Resources that Final Approval be given. He then signs his approval and permission is dispatched. The interim stage in the process is Provisional Approval, when the sub-division has been approved but is awaiting a legal survey. Most applicants fail to progress beyond this stage, principally because of the expense of getting this survey carried out (J. McGill, pers. comm 1996).

[6] For all applications to sub-divide property (i.e. those that did not receive FA), 323 or 34% were coastal and of these, 263 (i.e. 73% of coastal sub-divisions) were in mangroves. The location of sub-divisions applications reaching Final Approval is therefore considered representative.

Figure 31 **Distribution of coastal sub-divisions given final approval 1986-1993**



Source: LSD records.

Ambergris Caye has the second-most sub-divisions, but interestingly, these are not associated with San Pedro itself. Instead, they reflect the buying up of coconut plantations by US real estate speculators, and their sub-division and for re-sale as lots for building holiday and retirement homes. A typical example of the areas involved is shown in Plate 11. In these cases, there is relatively little impact on mangroves, since the fringing mangroves were cleared when the plantations were originally established (in the 1890s-1930s).

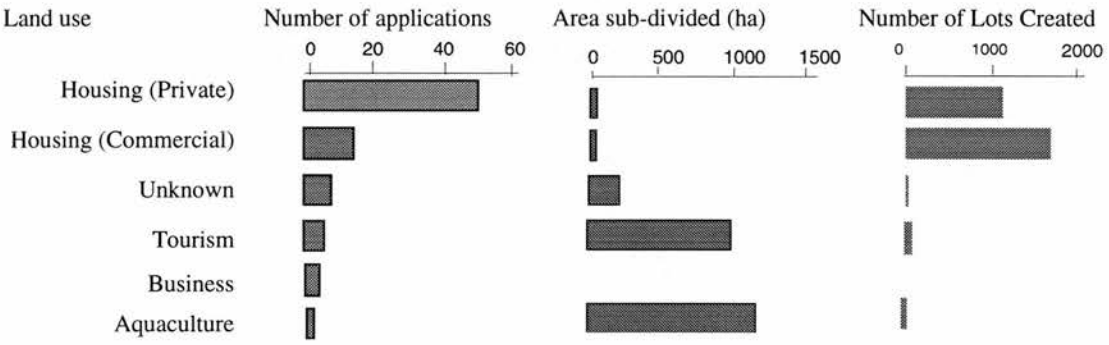
Plate 11 **A coconut plantation to the north of Rocky Point, Ambergris Caye, growing on land which is being sub-divided for house lots**

The intensity of coastal sub-division is considerably less elsewhere in Belize, although secondary concentrations do exist. These are at Placencia and Caye Caulker, both associated with tourism developments, and Four Mile Lagoon, Consejo and Sarteneja. This latter concentration has little impact on mangroves though, because they do not generally coincide with mangrove areas (see Figure 23). Elsewhere, the level of sub-division is relatively minimal, and absent from the central and southern cayes.

Having established the distribution of sub-divisions, the next characteristic examined is their development purpose. The first consideration is whether it was carried out on a commercial or private basis. For mangroves sub-divisions, 13% of those approved were private. Most of these are divisions of parcels between family members. Over 79% were some form of business venture. Although similar to the proportion for the coast as a whole, this is 9% higher than the national division between these two categories. This shows that commercial activity and therefore commercial stakeholders, are relatively concentrated on the coast.

The second sub-division feature examined was the proposed development purpose. The results of this are given in Figure 32. Once again, housing is the most common development intention. Evidently, private sub-divisions are most numerous but commercial housing developments generate the most lots. Tourism sub-divisions effect a far greater area, even though the number of lots and applications are limited. The cause is the number of large estates bought up in recent years by foreigners setting up eco-tourism resorts. The area and number of lots associated with business projects is very limited, primarily because these have little need to create new parcels. Aquaculture projects, although rare, do demand large areas for growing out ponds, and this accounts for the large area they have divided.

Figure 32 Development purpose of the 83 sub-divisions in mangroves approved over 1986-93, by land use, number of applications and lots created

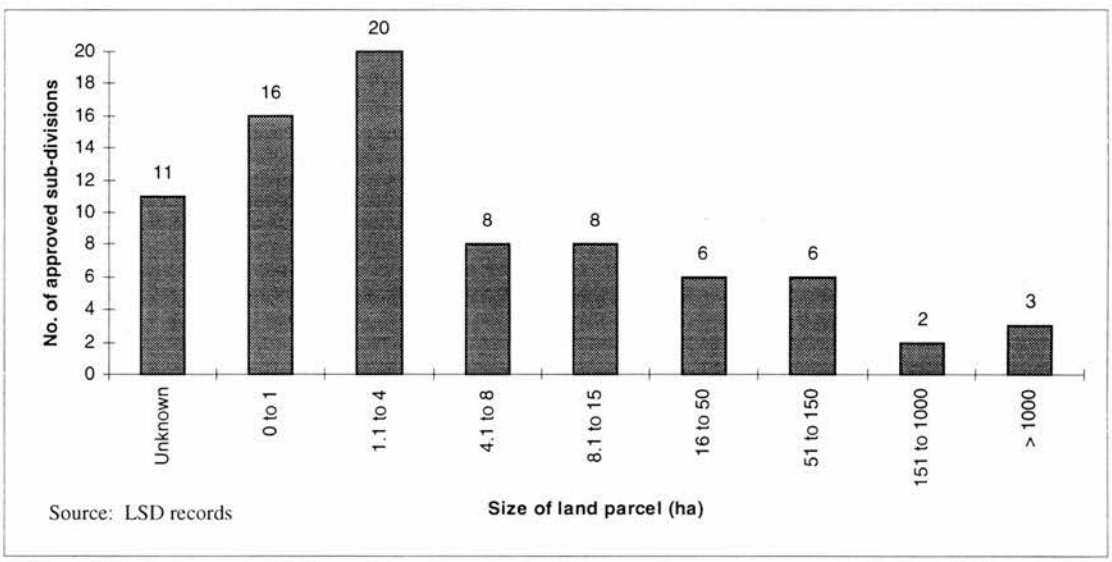


The third feature that is useful in determining the stakeholders, character and impact of mangrove exploitation is the nationality of the individual or company doing the sub-division. The results show that just over half are from Belize. Therefore, in the search for elite influence in land development, the principal emphasis needs to be on these local stakeholders. It also needs to respond to the fact that there is also a heavy North American influence. Applicants from Canada and USA (4 and 28 respectively) were together responsible for over a third of the remaining approved sub-divisions involving mangroves.

These business people, mostly pursuing real estate developments for tourism, form a significant part of the pro-development business nexus. Their socio-political influence is therefore important to consider as well.

The final aspect of sub-divisions to consider is the area being affected. Out of all 83 applications, the size of 11 parcels was unavailable. The remainder totaled 24,181ha, equivalent to 1% of Belize's land area. The majority of this is from one sub-division linked to the creation of a private nature reserve (9,000ha) (see below) and two sub-divisions for aquaculture (3,362ha and 7,979ha) [7]. The great majority are 4ha or less (median value is 3.85ha for the parcels of known size). The distribution of parcel size for land being sub-divided is shown in Figure 33.

Figure 33 Distribution of parcel size for approved sub-divisions in mangroves 1986-1993



Out of the 83 original properties, the 24,181ha was sub-divided into 2,888 extra parcels. Assuming all these are sold to different people, this increases the number of coastal land owners, i.e. the number of stakeholders by almost 35 times. Furthermore, with a median of 3.5 parcels created per sub-division, there is an average approximate three-fold increase in owners for each mangrove sub-division approved.

[7] The sub-division application number for the reserve is 467 and 63 and 191 for the aquaculture developments.

Overall, the sub-division data has added to the evidence on the distribution of mangrove exploitation. It has also confirmed housing as the most common cause of clearance. It has highlighted the significance of tourism and the small number of real estate developers driving this type of development.

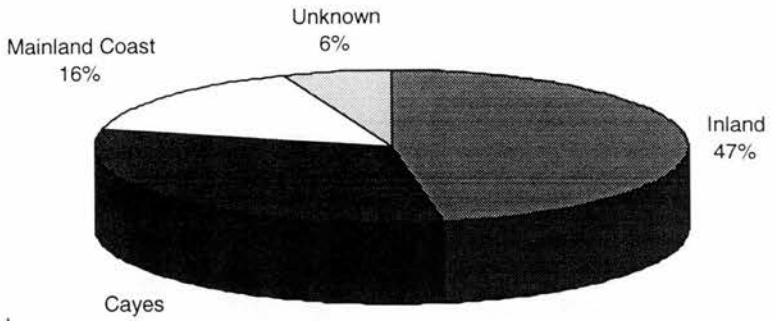
In the next assessment, the increasing number of parcels being bought by foreigners is scrutinised using a further set of government records. Their analysis provides evidence for the origin of buyers and the uses to which their properties are being put.

5.5.3 Foreign Land Ownership - Distribution and Development Trends: The final macro-level analysis carried out is for land bought by foreigners, or 'aliens' as they are generally known in Belize. Useful in its own right, this also adds to the insights provided by the sub-division analysis, since buyers may either be purchasing sub-divided property or sub-dividing it themselves. The aliens data also reveal the landowners selling to foreigners.

Methodology: The method used to assemble and the aliens data is described in Appendix 8 and from it, there are three points to note. The first one is that proof could not always be obtained that the buyer actually went on to purchase the land after getting the licence. Although LSD staff and real estate agents estimated that this occurs in about 90% of cases, it has not been assumed in this research. Rather than discount the cases where proof could not be obtained, the data are therefore used to express 'demand' rather than 'realised' buying of property. Secondly, the aliens legislation did not require a license for purchases of less than 0.2ha, except if the property was within a 'declared area', in which case any purchase, regardless of parcel size, required one. As land speculation spread, new parts of the coast were made 'declared areas'. Consequently, the qualifying criteria for licences have changed to encompass more land sales. Thirdly, as coastal property was sub-divided, the average size decreased, so an increase in buyers does not necessarily reflect a greater area being bought. Both these last characteristics make it difficult to carry out time-series studies of foreign land holding. Nonetheless, by filtering the data, certain characteristics can still be detected.

The collation of licence data has revealed a total of 1,313 applications made over the period 1974-93. Again, as with the sub-division data, the first consideration is the distribution of demand for land by foreigners. Nationally, the results reveal that applications for buyers are equally divided (47% each) between inland and coastal locations (Figure 34).

Figure 34 The location of parcels foreigners sought to buy, 1974-93



Source: LSD records

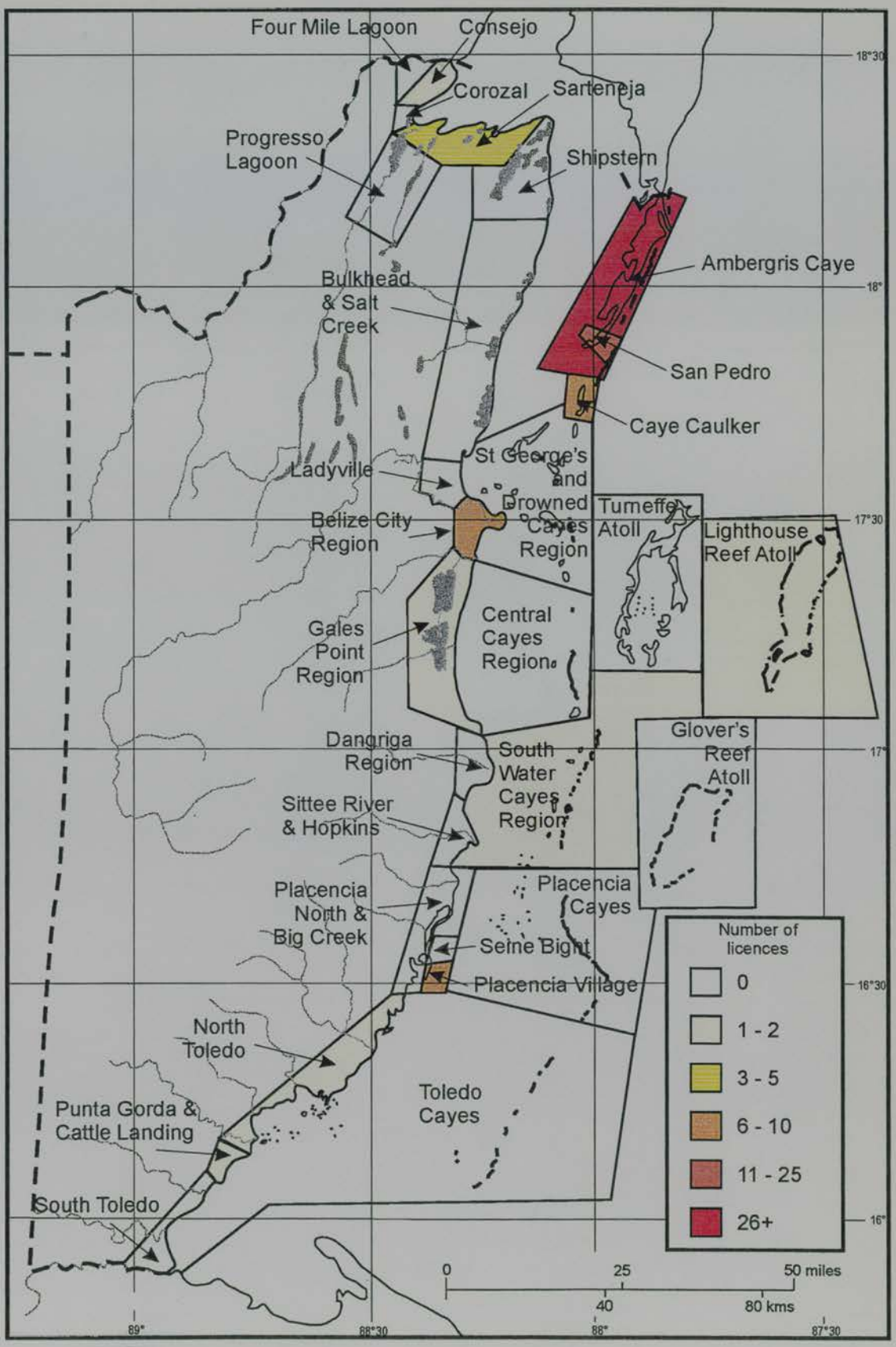
In reality however, because of the above factors and others, this national distribution reveals relatively little [8]. The distribution of aliens' applications is in fact, heavily distorted. In order to refine the analysis of aliens distribution, a sub-set of the aliens data has been used that removes at least part of the distortion.

In 1992, all cayes were designated a declared area, replacing the previous designations that covered San Pedro and Caye Caulker. Analysis after this is on a uniform basis for the cayes, Placencia and Hopkins (which already had 'declared area' status) and for parcels over 4.5ha in rural areas or 0.2ha in urban areas elsewhere on the coast. The distribution of the 101 coastal applications for 1993 (the last full year reviewed) was assessed, and reveals the pattern shown in Figure 35. The main concentration is on Ambergris Caye, followed by San Pedro. Caye Caulker, Belize City, and Placencia also have significant demand. Again of interest is the lack of demand for the rest of the cayes. The demand around Sarteneja is less important for mangroves because of their scarcity in this area.

The second feature to examine is the aliens' proposed development purpose. Results shown in Figure 36 again reflect the dominance of housing, with the range and level of other development types similar to that for sub-divisions. Given the dominance of Ambergris Caye, examination of applications here shows that out of the 63 licences where the use was known, 52 (83%) were for private homes, six (10%) for commercial housing and five (7%) for tourism. Of the 52 for private homes, 24 were for holiday homes and six were for retirement (the precise purpose was not specified for the remaining 22 licences).

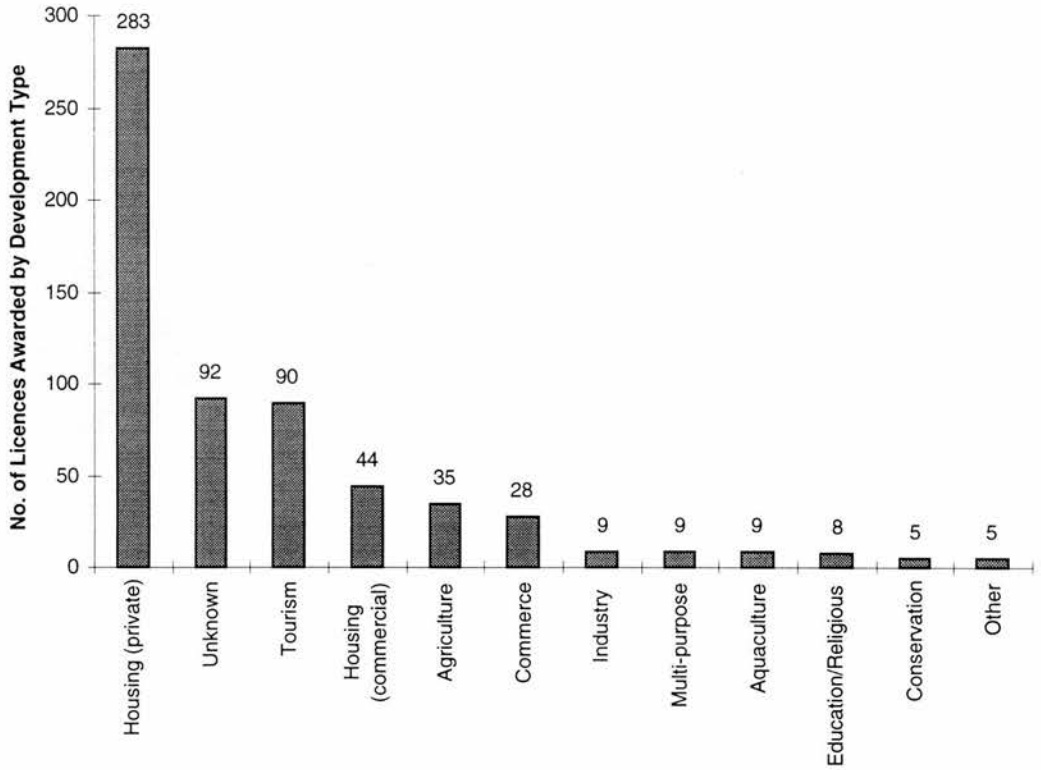
[8] The larger average parcel size in rural areas (therefore more frequently surpassing the 4.5ha threshold requiring a licence) has a distorting affect that makes applications more likely *inland*. The larger number of parcels inland also leads to a higher number of purchases there, simply on the basis of supply. The fact that five out of the six declared areas (99% by area) are in the *coastal zone* generates a bias towards this region.

Figure 35 **Distribution of 101 coastal properties for which aliens land holding licences were awarded in 1993**



Source: LSD records

Figure 36 **Development purpose of applications by foreigners to buy coastal land 1974-1993**



The final feature of note is the nationality of buyers and vendors of the land. The nationality of purchasers and vendors is unrecorded in many cases, but where known, a heavy American bias is revealed. Of the applications for which the nationality could be ascertained, 665 applications (85%) were from the USA, with other nationalities considerably behind (76 from Taiwanese (9%), 34 from British (4%) and 31 Canadian (4%) applicants). The applications from Taiwanese is a relatively recent phenomenon, an expression of the relations identified in the previous section. Rising in the early 1990s, it dropped significantly by 1995, principally because most Taiwanese individuals bought Belizean citizenship and therefore no longer require an aliens licence.

Of the vendors, results show land is being sold by Belizeans in 303 (45%) cases, but significantly, 363 (54%) cases by Americans. This suggests that over half the land sales over the study period are between foreigners. This is interpreted to result from the high degree of land speculation along the coast. Scrutiny of these records *and* examination of sub-division data reveals five people in particular to be involved (Iain Ritchie, John Edwards, Gerry and

Corry McDermott and Al Dugan). As businessmen, rather than elites, analysis of their specific role is examined in Chapter 7 using the case study of Turneffe.

Overall, this analysis of aliens land holding has revealed a substantial increase in the presence of foreign land owners in the coastal zone, particularly Americans. The majority of these have bought land for holiday and retirement homes, from land speculators who are also American. Given the beach front location of the majority of these parcels, (evident from the plans submitted with the licence applications), the mangrove most affected by these developments is fringing mangrove, plus, in some instances, the seaward side of basin mangrove. As already highlighted, in the majority of cases, these have already been cleared as a result of the establishment of coconut plantations. Fieldwork shows however, that there are sites where this is not the case, notably southern Ambergris Caye and southern Caye Caulker. Here, fringing and basin mangroves are being cleared to improve sea views and circulation of sea breezes around these holiday/retirement properties.

Having collated all these different data sets, cross-referencing the aliens, sub-division and mangrove permit information shows the linkages and stakeholders involved in this type of tourism development. The largest such clearance is the 9ha of fringing and basin mangrove being developed by Al Dugan's 'Club Caribbean' project [9]. A second substantial example is Dane Dingerson's sub-division on Caye Caulker [10]. Far more typical of the mangrove alteration associated with this type of development are the clearances for single plots which involve trimming or loss a fraction of a hectare. From examination of the mangrove permit data, those responsible for this type of clearance have done so without a permit. Of the large projects, only Club Caribbean has put in an application, although they described their 9ha clearance as 'trimming'. None of the other main real estate speculators has submitted applications to clear mangroves. Only one alien with a land holding licence has applied for a mangrove alteration permit [11].

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[9] See Mangrove Permit Application number 4.

[10] See sub-division number 340. Of the resulting 57 parcels, 10 aliens licences were subsequently awarded.

It is interesting to note that the interior of basin mangroves frequently prove too expensive for these developers to fill, so on their sub-division plans, as a marketing tool to attract their generally environmentally aware clientele, these areas are zoned as 'nature reserves' (e.g. Dingerson's sub-division).

[11] For example, mangrove permit application number 45, at Boca del Rio, Ambergris Caye.

All these characteristics of foreign ownership raise concerns for the sustainability of mangrove use. In particular, fisheries productivity and coastal erosion, as well as the overall 'ecological balance' of the nearshore environment are considered at risk. This is particularly important in the case of Ambergris Caye and Caye Caulker, where the reef is in close proximity to the shore. Mangrove clearance is therefore more likely to have an effect on these adjacent ecosystems in this situation.

The only mitigating factor that the aliens sub-division data show is that plots are relatively small. The mangroves are therefore being fragmented over large areas, but not removed. They are therefore able to continue to provide their functions to a certain degree [12].

Summary: A considerably improved set of information on mangrove exploitation has now been assembled through the analysis above. Each component has particular strengths and weaknesses in terms of what it can reveal, but the synergistic insights do allow a greater understanding of the mangrove development process. It also builds up the background knowledge of 'movers and shakers' influencing mangrove development. Below, in the penultimate section of this chapter, these insights are brought together to elaborate on the main types of mangrove exploitation identified. The purpose is to synthesize results to date, in preparation for a summary of impact on stakeholders. Proceeding from this, the detailed characterisation of the role of individual elite stakeholders takes place in Chapters 6 and 7.

5.6 Evaluation of Mangrove Exploitation - Sustainable or Not?

The analysis from above has shown the characteristics of mangrove exploitation and the principal stakeholders involved. In this final section, details of the main types of use are drawn together. Settlement growth is covered first, then protected areas, aquaculture impacts and transport.

5.6.1 Settlement Growth and Mangrove Loss: Evidence shows that clearance for housing is the main form of mangrove exploitation in Belize. Two types of housing development are involved. The first results stems from *local* population growth, household formation, ancillary activities and multi-purpose commercial activities associated with the settlement. The second arises from *tourism-driven* settlement expansion. Here, there may

[12] The 'marginal value' of each area of remaining mangroves is the critical issue here. This is an area that needs to be addressed in more detail in mangrove research.

also be population growth, in that immigrants are attracted to these places to work, but in this instance, commercial development is almost entirely related to tourism. The impact on mangroves of this type of growth will be looked at second.

5.6.2 Settlement Expansion for Local Growth - Housing, Ancillary and Commercial Development: Six settlements were identified where mangrove exploitation has resulted from this type of growth. Their main characteristics are summarised in Table 7. Highlighted below, for each of the six, are the trends in their expansion and an evaluation of the sustainability of the resulting mangrove use.

Table 7 Settlement expansion from housing, ancillary and commercial development

Settlement	Mangrove Impact	Main Activity	Mangrove Uses Identified	Sustainability Issues
Belize City	Very large	Commercial, industrial and service centre for the nation	Clearance for housing, commerce, industry and city infrastructure. Recreational and subsistence fishing. Harvesting for scaffold poles (rare).	Highly productive basin, fringing and riverine mangrove forest occupying the Belize River delta. Near shore waters important for wild shrimp harvest. Also contain highest concentration of West Indian Manatee in Belize (McField *et al.* 1996). Removal of mangroves threatens these benefits. It also removes the buffer against hurricane impacts.
Ladyville	Large	Housing, commerce and industry	Clearance for housing, commerce and industry.	Productive basin and fringing mangrove forest forming the northern limit of the Belize River delta. Removal of mangroves takes away Ladyville's buffer against hurricanes plus impacts as above.
Dangriga	Moderate	Housing. Regional commercial and service centre	Clearance for housing. Some fuelwood extraction, recreational and subsistence fishing	Loss of riverine and basin mangroves reducing the fisheries available for locals to catch from the North and South Stann Creek Rivers which run through the town.
Corozal	Moderate	As above	Clearance for housing.	Loss of fringing mangrove and possible minor alteration of hydrology of the New River delta. Loss of flood storage capacity. Encouraging people to live in an area susceptible to flooding and hurricane risk.
Punta Gorda	Small	As above	Clearance for housing.	Loss of estuarine mangroves likely to affect nearshore fisheries productivity.
Sarteneja	Small	Fishing village	Clearance for housing. Subsistence and commercial fishing	Loss of fringing and basin mangroves not likely to be significant because of their low productivity and character of adjacent marine habitat. This shallow marl shelf has high inorganic turbidity which makes it unsuitable for commercial or subsistence species of fish.

Source: Field data.

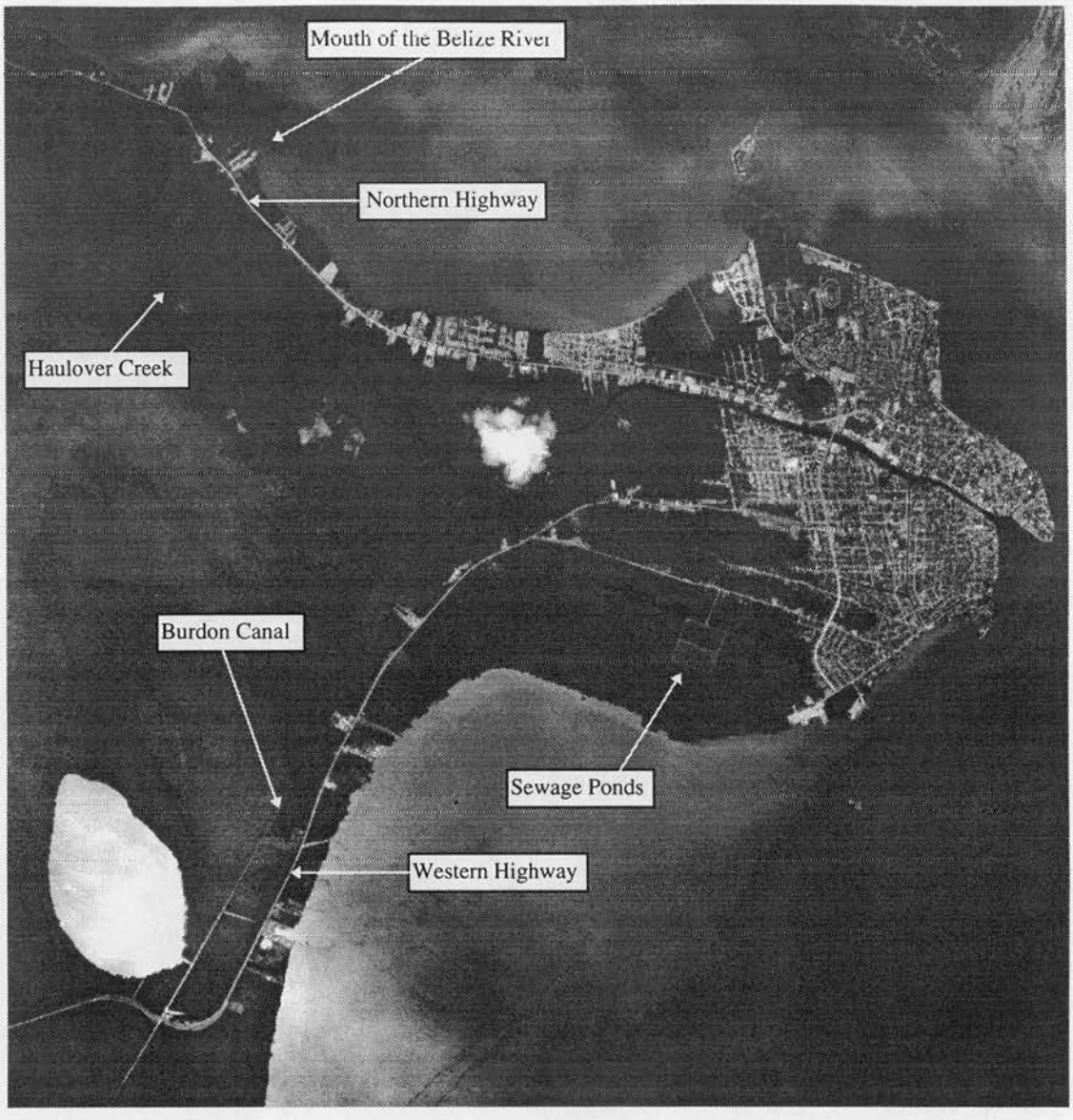
As Belize City and Ladyville are the subject of specific case studies in Chapter 7, their examination here is kept short.

Belize City: As is already evident, the expansion of the City is the main cause of mangrove clearance in Belize. In turn, this is largely due to the increase in areas cleared for housing. Most of this is from large-scale government developments. The mapping assessment, particularly from the 1992 air photos, helped to quantify their extent. Extra details were obtained from fieldwork and scrutiny of the LSD's Surveyors Job Book and Property Plans. These sources proved especially important because government housing projects are not subject to scrutiny under the sub-division or mangrove permitting procedures.

The government projects responsible for the majority of clearance for housing are the Belama Extension (45ha), Fabers Road (45ha) and St. Martins (39ha). In addition to these, three large private projects have been identified. These are Punta del Este (cleared 101ha out of a total property of 250ha), Bella Vista (28ha), and Buttonwood Bay (27ha) (the last two were completed in the early 1980s). Interesting patterns of elite involvement do begin to emerge here, in that certain elite individuals, particularly Javier Garcia, are heavily implicated in both these private *and* public projects. Given their scale and impact, this clearly needs to be scrutinised (see Chapter 6 and 7). In the mean time, the key features of the City's growth and the location of these major projects are shown in Figure 37 and 38.

As well as the escalation in mangrove clearance from housing, fieldwork, mapping and sub-division data show other areas are being converted for commercial development, light industry and associated urban infrastructure. The nature of this is however, far more piece-meal, small scale, and integrated within housing areas. The impact of each individual development is relatively insignificant. Two exceptions exist, however, which involved large scale clearance of mangroves.

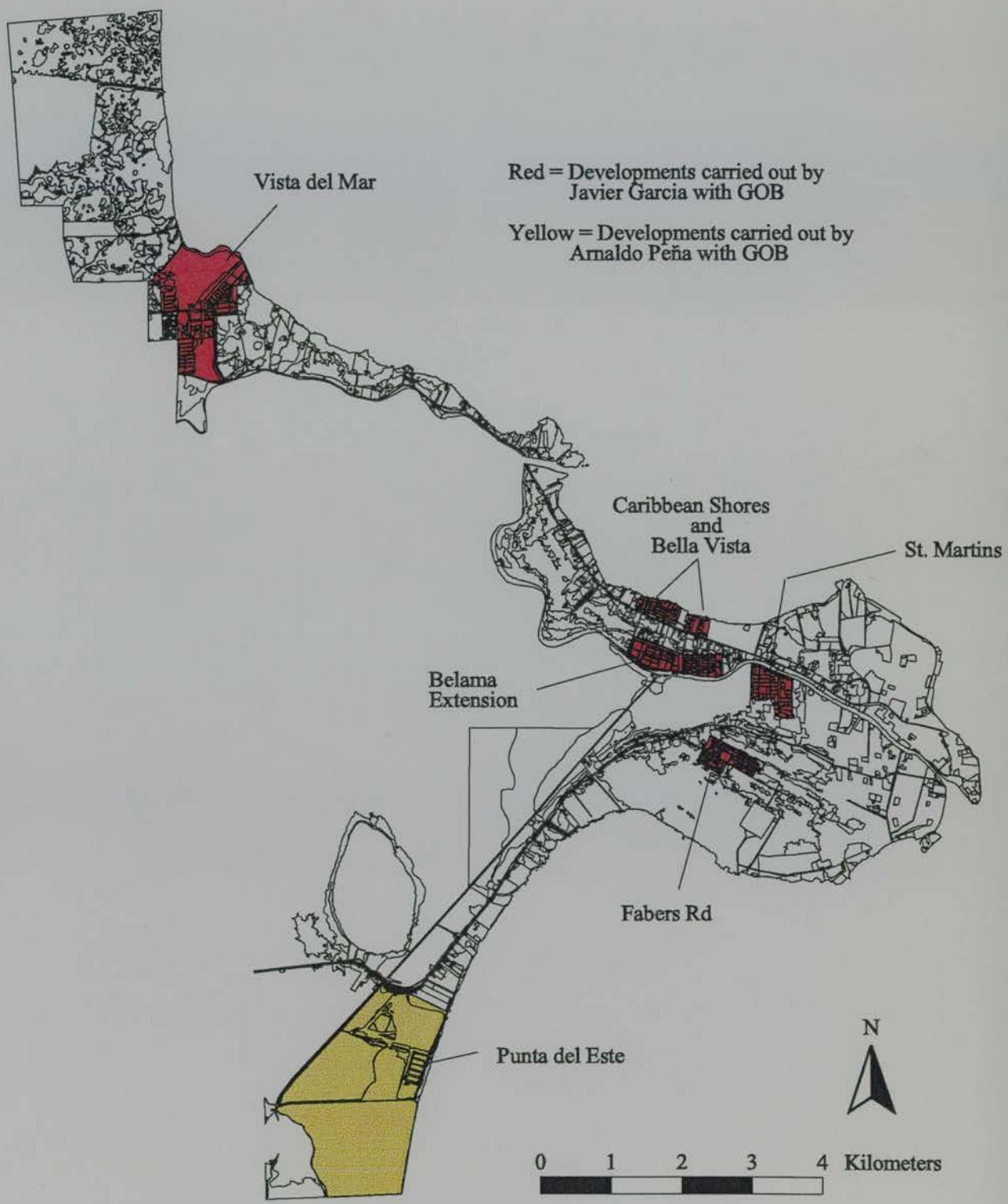
Figure 37 The setting and main features of Belize City's growth to 1990



Source: B/W Air Photo. March 1990 (Original scale = 1:44,000)

The first of these is the waste dump, the citing of which is shown in Plate 12. Leading to the clearance of 15.2ha of basin forest (by 1992), it was chosen because dumping rubbish is seen as a way of cheaply filling mangroves. There are two reasons however, why this location goes against the criteria for sustainable mangrove use. Firstly, the permeable peat underlying the area means that the pollution from leachate can spread to the surrounding areas, damaging the health of surrounding mangroves. Secondly, by its close proximity to settlement, it creates a public health risk and odour nuisance.

Figure 38 **The identity, location and developers of major Belize City housing projects responsible for mangrove loss (1992)**



Source: Map produced by transferring air photo interpretation of colour air photo enlargements (approx. scale = 1:8,000, dated March 1992) on to Arc/Info GIS.

Plate 12 **The location of the new Belize City waste dump, opened in 1993**

The other large development is the sewage treatment ponds. Constructed in 1982 by the Water and Sewage Authority (WASA), it cleared 9ha of basin mangrove forest. The retention of a 100m mangrove buffer around the ponds was one feature that reflects a sustainable design approach, to reduce the dispersal of effluent in the event of a hurricane. In this respect, the development could arguably be considered 'sustainable' [13].

Plate 13 **Sewage treatment ponds in the mid-ground (with port and housing development in mangroves also shown)**

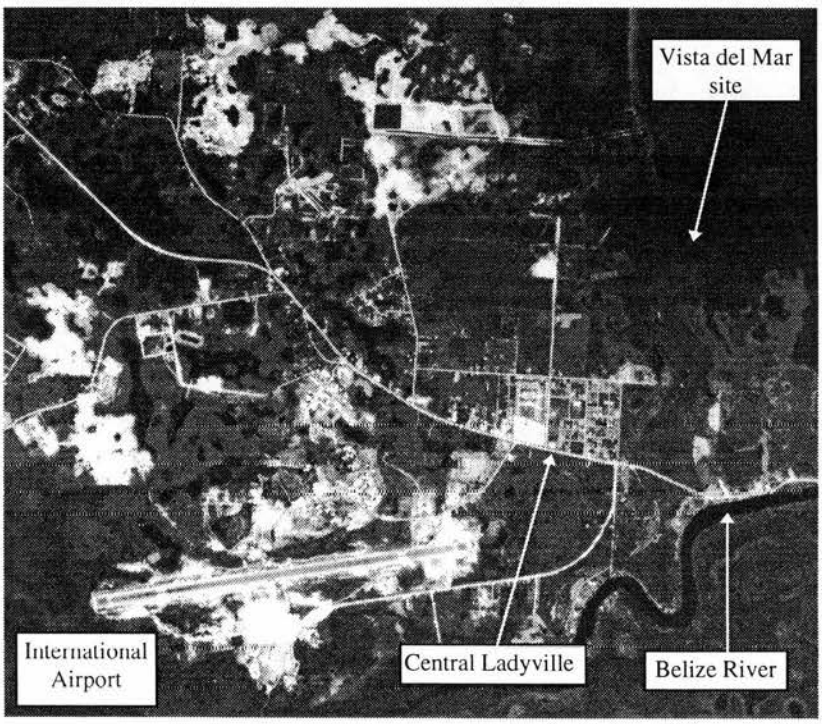
[13] The waste treatment approach did however, fail to use the biofiltration function of the surrounding mangroves. A US mangrove specialist, at the invitation of the BAS, had made such recommendations to WASA that the effluent should be dispersed into the mangrove for tertiary polishing. This measure would have reduced the nutrient loading going into nearshore waters from the one existing discharge canal, cutting the risk of eutrophication. WASA have not taken this up because their monitoring shows that existing nutrient dispersal is sufficient.

Ladyville: The impact of this settlement on mangroves has been almost entirely due to one private development known as Vista del Mar. This was the largest housing project in the country, responsible for the illegal clearance (i.e. without a permit) of 121ha of basin and fringing mangrove (see Chapter 7 for case study).

The project's impact is two-fold. Firstly, it removed the large mangrove belt protecting Ladyville in the event of a hurricane. Secondly, it encouraged people to live on low-lying coast, vulnerable to this type of hazard, which has a return interval of approximately 1 in 40 years. Although the development was responsible for raising the ground level approximately 0.6m, this still leaves it vulnerable to the flood levels of 2.5-4m associated with hurricanes. This scenario is characteristic of Blaikie *et al.*'s (1994) explanation of 'natural' disasters, when they maintain their impact is of anthropogenic origin (refer back to Figure 11). Furthermore, the risk is exacerbated by the construction of a central canal through the development, penetrating the area and bringing the flood risk closer to Ladyville's centre.

The analysis of media reports and sub-division records revealed the origin and passage of this development and reveals considerable elite involvement. As a result, this project is subject to detailed scrutiny as a case study in Chapter 7.

Figure 39 The identity of mangrove-related development in Ladyville

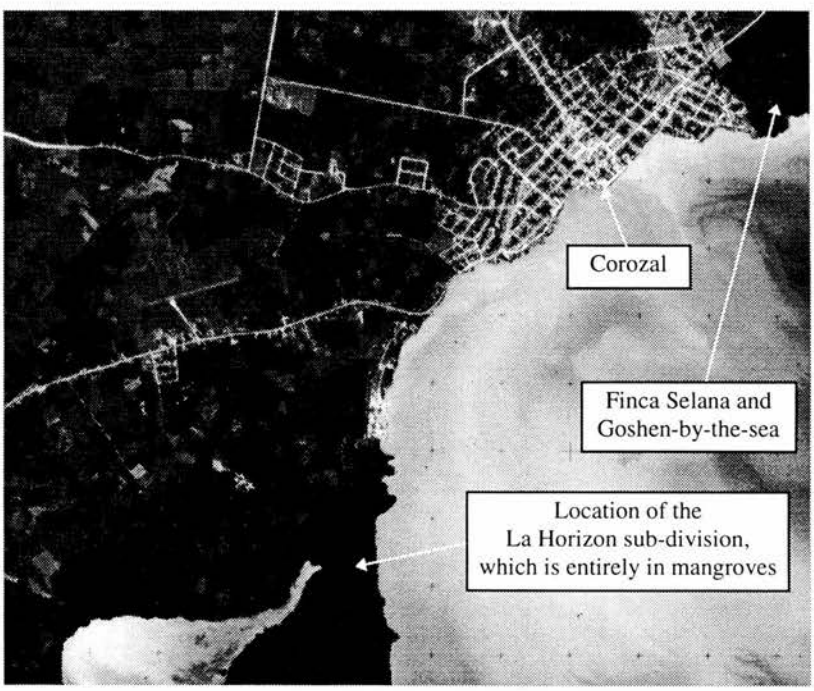


Source: B/W Air Photo 18th Dec. 1961 (Original scale = 1:30,000) and March 1990 (Original scale = 1:44,000)

Elsewhere in Ladyville, a range of smaller private housing sub-divisions have added to mangrove clearance to the south of Vista del Mar. Done by Taiwanese developers, these converted further basin mangrove, again without permits. The same environmental concerns apply to these developments, although without the additional problem related to the canal.

Corozal: According to the distribution of sub-divisions, Corozal's growth is mainly westwards, inland away from the coast (Figure 40). There are, however, three developments catering for expansion northeast and south along the waterfront. Finca Selana and Goshen-by-the-Sea, are state and private housing sub-divisions to the northeast. Their impact on mangroves is minimal. As field work showed, mangroves here are limited to a discontinuous, one tree deep fringe, since the shore is roughly 0.4m above mean sea level. By contrast, the third coastal development, to the south, involved extensive illegal clearance of dwarf basin and fringing mangrove in a large dredge and fill operation called La Horizons. Sustainable use of mangroves would dictate that the basin area be left as a natural flood retention area, rather than being in-filled as has occured. In addition, the clearance of fringing mangroves risks erosion of the coast and lagoon and detracts from the organic input into the marine food chain. Again, from indications by Respondent 3, the developer of this site is a member of the elite so the project is examined in Chapter 7.

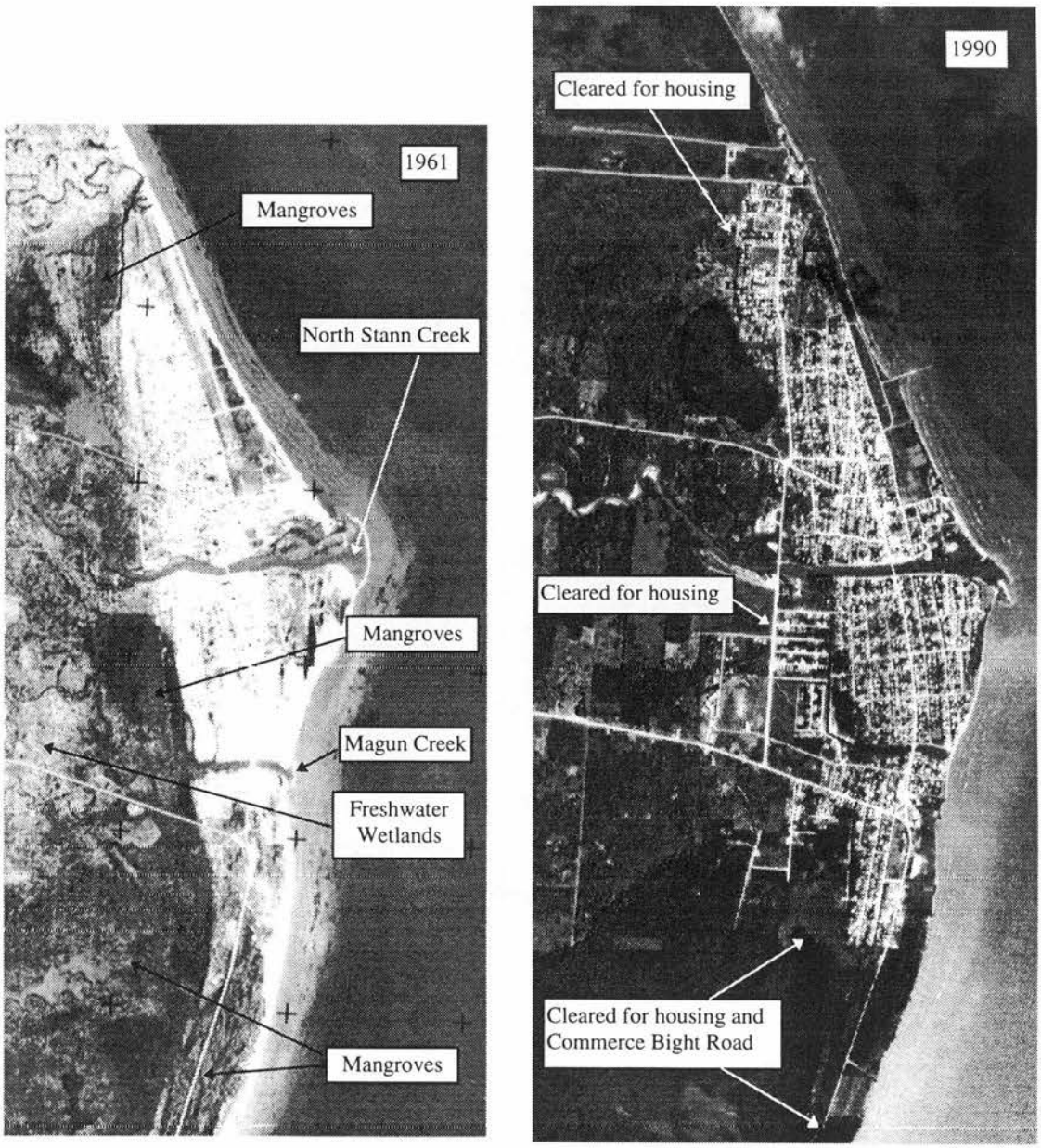
Figure 40 The identity of mangrove-related development in Corozal



Source: B/W Air Photo March 1990 (Original scale = 1:44,000)

Dangriga: Dangriga's front streets are built on the beach berm piled up by the prevailing easterly waves reworking discharged material from the North Stann Creek (Figure 41). Between the beach berm and the higher land to the west, there are in the resulting depressions. These are colonised by mangroves and freshwater wetlands, which have been infringed upon as the town has expanded west. Mangrove to the south of the town have also been cleared, associated with the Commerce Bight road. Mapping showed that by 1990, approximately 4.7ha of mangroves had been converted to accommodate the town's growth.

Figure 41 The identity of mangrove-related development in Dangriga

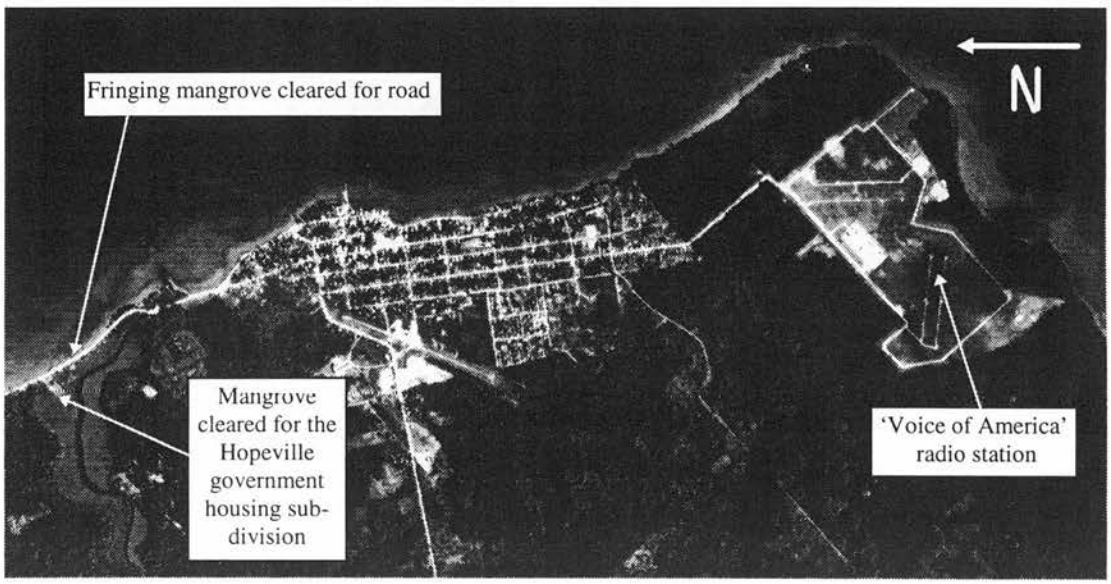


Source: B/W Air Photo 18th Dec. 1961 (Original scale = 1:30,000) and March 1990 (Original scale = 1:44,000)

The clearance of riverine and basin mangroves in Dangriga is likely to have reduced the fish in the two rivers that cut through the town, but has not had any other significant impacts. In general, the clearances have been piece-meal and small scale, carried out by families expanding their own homes. To the south of the town, there is a 12ha clearance for a housing sub-division by the Zabaneh family. Given their status as the most powerful family in the district, this is examined in Chapter 6.

Punta Gorda: Mangrove associated with Punta Gorda is limited because of its higher elevation. Nonetheless, the mangroves that did occur have now been almost entirely cleared. This began with the loss of a small strip of fringing mangrove that occupied the shoreline between Punta Gorda and Cattle Landing. This was cleared when the road was put in place (pre-1950s) (Figure 42). To the south of Punta Gorda, clearance of fringing mangrove took place in the mid-1980s for the development of the 'Voice of America' radio station. Neither of these developments amounted to the loss of more than 1ha in each case. In 1989 however, approximately 16ha of deltaic dwarf red mangrove was cleared for the government housing project known as Hopeville. The nature of this development is illustrated Plates 14 and 15, and is discussed in Chapter 6.

Figure 42 The clearance of mangrove associated with the growth of Punta Gorda



Source: B/W Air Photo March 1990 (Original scale = 1:44,000)

Plate 14 The Hopeville housing project, showing in-filling of basin mangrove

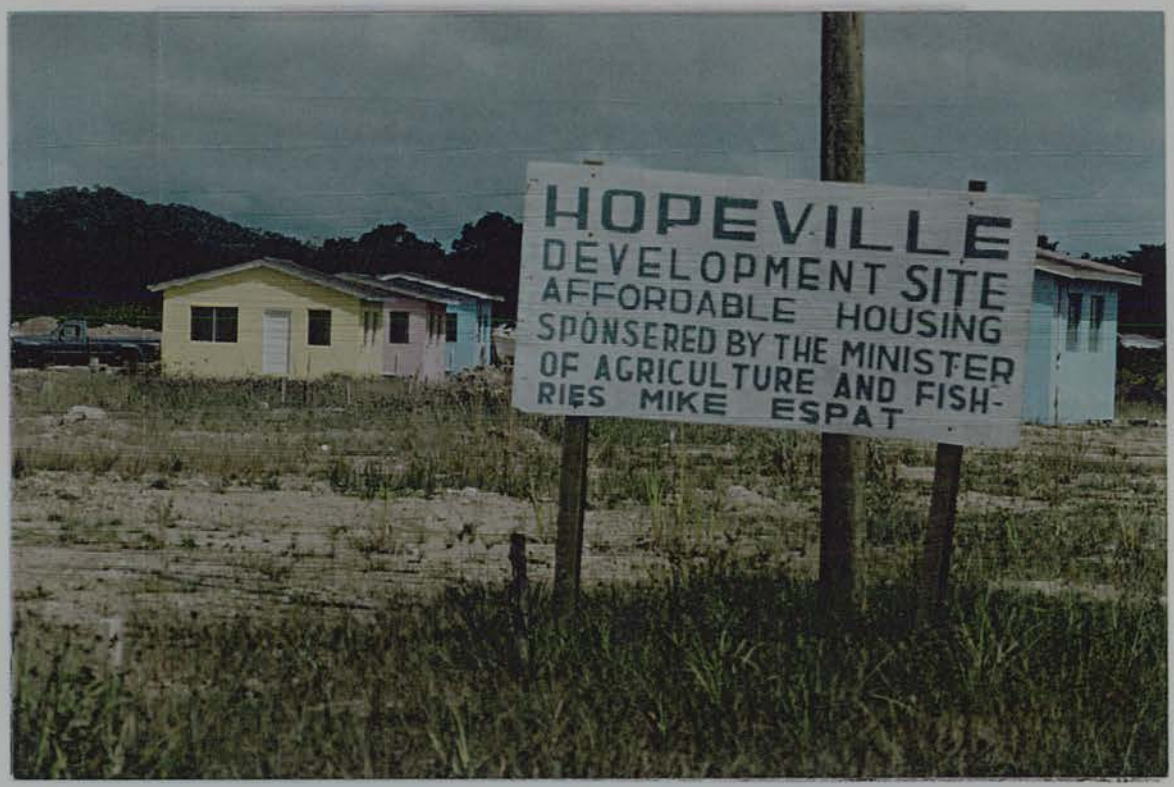


Plate 15 Clearance of riverine mangrove for the Hopeville housing project

Summary of the impact on mangrove from settlement expansion for housing: By 1990, throughout Belize, a total of approximately 700ha of mangroves has been cleared for housing. This represents just under one third of all the mangrove converted by this time. Given that the majority of the mangrove cleared, filled or degraded was also carried out for housing projects (from mapping and cross-referencing with sub-division data), this increases to just over two thirds (1,549ha, or 69%) of all clearance. Clearly, as the major mangrove impact, analysis of the role of elite stakeholders in housing development is a priority.

5.6.3 Settlement Expansion From Tourism and Ancillary Development: The results from the research above also highlight the growing significance of tourism as a major influence on mangrove exploitation. From site visits, mapping and scrutiny of the land development records, it has been spurring the expansion of San Pedro, Caye Caulker and Placencia. The main characteristics of this growth and its impact on mangroves are summarised in Table 8.

Table 8 Settlements where mangrove impacts are driven by expansion from tourism and ancillary development

Settlement	Mangrove Impact	Main Activity	Mangrove Use	Sustainability Issues
San Pedro	Moderate	Tourism centre for the country. Commercial fishing.	Clearance for housing. Sports, commercial and recreational fishing. Eco-tourism (bird watching)	Increasing proportion of higher land now occupied by hotels, holiday homes and ancillary businesses. This is forcing locals and new tourism facilities into mangrove areas.
Caye Caulker	Moderate	Tourism and commercial fishing.	Clearance for tourist development and infrastructure.	High land on south half of the caye increasingly occupied by holiday homes. Residential area for local inhabitants increasing limited, and likely to require north half of the caye to be developed. Increasing clearance of fringing mangrove by tourist operators.
Placencia	Small	Tourism and commercial fishing.	Clearance for tourist development and infrastructure. Boat access.	Increasing boat use by tour operators (for fishing, eco-tourism and scuba) is leading to greater clearance of fringing mangroves on the peninsula's leeward side.

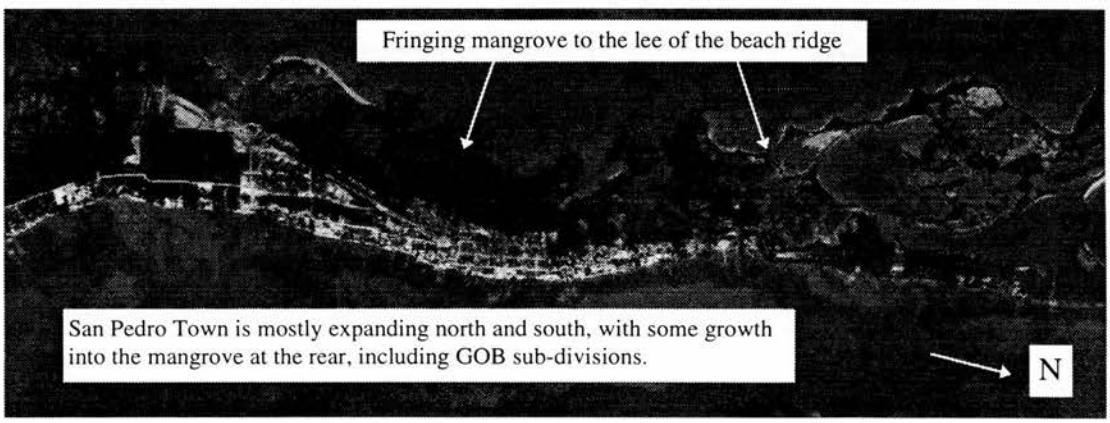
In each case, settlement growth is caused by a combination of public and private sub-division, the construction of new hotels and commercial properties, and the increasing infrastructure needed to cope with the tourist population. In particular, solid waste disposal of Caye Caulker and Placencia are in mangrove. This is also the case for San Pedro's new

sewage treatment works [14]. The second type of impact that tourism is generating is from the holiday and retirement sub-divisions. These are increasingly common around these villages and also at isolated sites, particularly along the beach front of Ambergris Caye. Finally, resorts are being built around the cayes and coast, a typical example being Jaguar Inn at Hopkins. Most of these are foreign owned, principally by Americans.

All these types of tourism development cause mangrove impacts, principally their clearance to use the land for hotels, cabañas etc.. In the great majority of cases, mangrove is not the preferred option for these developments, because of the additional costs of fill and/or drainage. Nevertheless, as littoral thicket and coconut plantations are increasingly taken up, there is no alternative. Equally, as high land has become too expensive for government to acquire for public housing, state projects have had to be increasingly located in mangroves. The nature and impacts of tourist-related growth is now considered for the main settlements involved.

San Pedro: A fishing village until the late 1970s, San Pedro has become the focal point for Belize's tourism industry. Whilst on a beach ridge originally, approximately 3m above sea level, it has out-grown this site and expanded to the north, south and west (Figure 43).

Figure 43 The location, features and expansion of San Pedro, Ambergris Caye



Source: B/W Air Photo, March 1990 (Original Scale = 1:44,000)

[14] In response to these water quality concerns brought about by the town's rapid growth, WASA has built a sewage treatment facility in 1996. Funded by the Inter-American Development Bank, the facultative treatment ponds have been constructed entirely in dwarf basin mangroves. The facility has been designed to disperse the effluent into the surrounding mangroves for tertiary polishing, to use the bio-filtration function of mangroves (Environmental Solutions Ltd. 1995).

With the tourism industry's premium on sea front property, an increasing proportion of local residents are being forced to live in mangrove areas to the rear. Equally unable to acquire land at market prices, GOB housing also is located here. San Pablo, the main project of this origin, is a dredge-and-fill sub-division involving the filling of approximately 25ha of dwarf fringing mangroves, to the lee of the island.

Private developments in San Pedro have mainly been north and south along the beach ridge. Their impact has been on fringing mangroves but on the east side of the caye. The removal of this is ecologically more significant. Firstly, it has been completely eradicated along the entire beach front. Secondly, the reef lies 0m - 950m from the shore, with sea grass meadows in the area between. Mangroves are therefore most likely to play a role in supporting fisheries in these habitats, both through the input of organic material and by providing nursery areas for fish. Their removal reduces fisheries productivity. Thirdly, with evidence of increasing eutrophication in the nearshore waters (caused by the leachate from septic tanks used for most household sewage disposal), these mangroves would also be important for biopurification of sea water. Their removal therefore exacerbates this risk.

On Ambergris Caye as a whole, there are several sub-divisions taking place on the sea front. The development immediately to the north of San Pedro River, and at Boca Bacalar Chico are examples where mangroves have been cleared. What has come to light from the sub-division data, is that the majority of these sub-divisions have been undertaken by the same small core of individuals [15]. Combining tourism business interests and land speculation, they have driven the conversion of coastal habitats in Ambergris Caye. Their details are summarised in Table 9.

Examination of the permit records shows that with the exception of one application by Dugan, for Club Caribbean, none of these developers applied for mangrove alteration permits, despite the fact that several of their sub-divisions involved clearance of fringing mangroves. In order to more fully understand the role of this type of developer in mangrove exploitation, and to assess their interaction with elites and other stakeholders, Dugan's development on Blackbird Caye Ltd. is examined in Chapter 7 [16].

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[15] See, for example, sub-division applications 8, 9, 384, 591 for Ritchie and 116 and 168 for McDermott.

[16] This was chosen in preference to further analysis of San Pedro for two reasons. Firstly, the development on Ambergris Caye itself has been investigated by other researchers (e.g. Taylor Gordon 1981). Secondly, the developers' strategy for securing the support of the political elite in this debacle was identical to the one used on Turneffe.

Table 9 Summary details of main real estate developers on Ambergris Caye

Name (Nationality)	Companies	Description of Activities
Iain Ritchie (UK)	Edwards-Thorpe Ltd. Belize Yacht Club Island Real Estate Ltd. Reef Colony Ltd. Southwind Properties	Sub-division of beach front for holiday homes
John Edwards (US)	Island Real Estate Ltd. Reef Colony Ltd. Southwind Properties	Sub-division of beach front for holiday homes
Corrie and Gerry McDermott (US)	Paradise Resort Hotel Ltd. Island Real Estate Ltd.	Sub-division of beach front for holiday homes
Al Dugan (US)	Palm Bay Club Ltd. Playa del Sol Ltd. Belize Investment Co. Club Caribbean Ltd. Blackbird Caye Ltd.*	Sub-division of beach front for holiday homes plus resort owner

* This company operates is on Turneffe Atoll rather than Ambergris Caye

Source: LSD records on sub-divisions and aliens land holding

Overall, San Pedro is characterised by increasing mangrove loss, and deteriorating environmental integrity. The development of the tourist industry has contributed to this process in a piece meal-way, since operations are generally small scale. The influence of elite involvement in this degradation is less evident. The explanation is the dominance of American private business operations, which do not generally lend themselves to political interference [17].

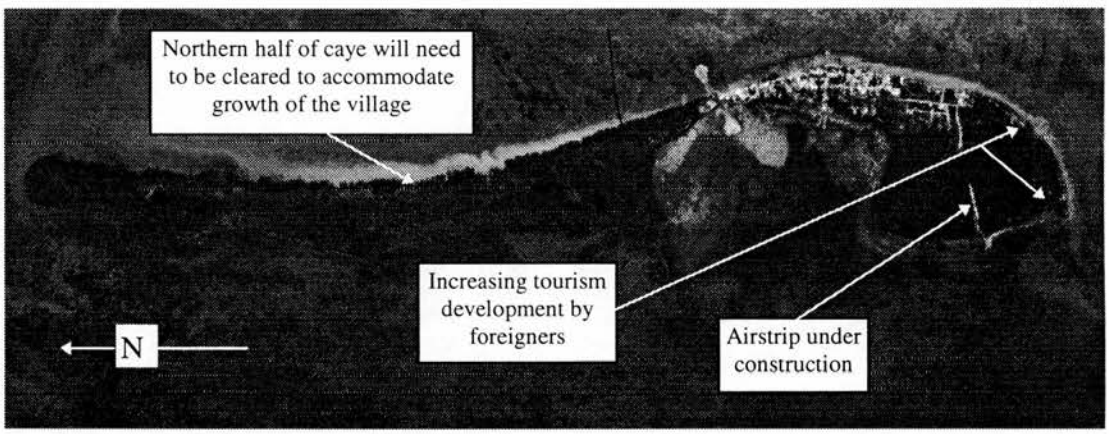
Caye Caulker: This fishing village has grown rapidly since the arrival of tourism in the late 1970s, but it has not yet occupied all the higher land (Figure 44). The combined pressure from tourism and increasing foreign ownership is however, causing land shortage. The increasing presence of American real estate developers and holiday owners in particular is dominating the south side of the island, where fringing mangroves are being cleared as a result [18]. Also in the south, the construction of the airstrip in 1990 cleared 4.3ha of basin mangrove thicket (based on mapping and site visits). This development was opposed by the

[17] There is an extremely important on-going example of elite involvement. Glenn Godfrey, the former PUP Minister for Tourism and Environment is a key figure in the development of the 8,910ha Pinkerton Estate. It occupies the majority of Ambergris Caye, and is proposed for a major development of hotels, marinas, golf courses and holiday homes. This project is still in the planning stage and no mangrove exploitation has taken place. Godfrey's role in the project has not been considered because insufficient evidence is available from either written records of discussions with respondents. Mr. Godfrey was also unwilling to discuss his involvement with this or any other of his coastal development projects. His role on Caye Caulker will however, be considered in Chapters 6 and 7 as more evidence was available in this instance.

[18] See, for example, sub-division application number 340, by Dane Dingerson (USA), sub-dividing a 3.9ha part of his larger holding into 57 sea front lots. From the aliens land holding data, 10 applications were recorded e.g. licences 91103 and 93109.

majority of residents. They lobbied the PUP area representative and Minster of Tourism and Environment, Glenn Godfrey for GOB assistance in the form of a water treatment plant. However, Godfrey supported a small nexus of pro-development tourism operators on the island (Respondent 4) and went ahead with the airstrip. His decision, it is alleged, was due to his property interests on the Caye. This case clearly raises issues of elite influence, and Godfrey's activities will be examined in later Chapters.

Figure 44 The location, features and expansion of Caye Caulker



Source: B/W Air Photo, March 1990 (Original Scale = 1:44,000)

In other respects, the impact of tourism on Caye Caulker is proceeding in a similar pattern to San Pedro. Residents and tour operators have removed the majority of fringing red mangrove fringe on the seaward southern half of the caye, to open up the view and increase the circulation breezes to keep down insects. Further mangrove alteration has also taken place on the leeward side of the village, mostly for working areas for fishermen and for boat access. At present, only the southern half of the caye is permanently settled, but there is increasing pressure to open up the northern portion for development, through government acquisition and sub-division of the land.

Placencia Peninsula: Mangrove clearance on this peninsular is from two main causes. Firstly, the increasing boat access required to service tourist operations (taking tourists diving, bird watching etc.) has necessitated the cutting of channels through the fringing

mangrove to its leeward size (Plate 16). Secondly, recent holiday home sub-divisions have been responsible for the conversion of mangrove at the peninsula's southern tip (Plate 17). This development has been carried out by the current UDP Minister of Tourism and Environment, Henry Young. Unlike Godfrey, he has however, sought the necessary mangrove permits for these development projects, albeit after prompting from the LUA [19]. His developments are also scrutinised further in Chapter 7.

Elsewhere in Placencia, the government has attempted to respond to the land shortage by acquiring lots for village expansion. This has been hindered by a surrounding belt of speculative, often foreign owned developments. The current growth has had to be a mix of private and government projects. Villagers' demand for land is not sufficient however, to get the government to clear mangrove to the leeward side in the same way as Ambergris Caye.

Overall, given the above, the development trajectory in Placencia is leading to increasing degradation of the leeward fringing mangrove habitat. This still however, only affects a relatively small proportion of this community type in the area, and therefore significant adverse impacts are unlikely. This trend is not however sustainable in the long run. In particular, this is the case if all property owners wish to have their own individual boat access. The current dumping of waste in the same fringing mangroves, is not a sustainable activity. Although on an extremely small scale, it is causing localised pollution (Plate 18).

Plate 16 Mangrove clearance for boat access to locally-owned hotel, Placencia

[19] The CFO sits on the Land Utilisation Authority and requested that sub-division approval only be granted on condition mangrove alteration permits were obtained. Young's applications for mangrove alteration permits are 15, 17, 25 and 27.

Plate 17 **Mangrove clearance for Henry Young's housing sub-division, Placencia**

Plate 18 **Mangrove clearance for the waste dump at Placencia Village**

Summary of the impact on mangrove from settlement expansion for tourism: Tourism in Belize is mainly marine-based and therefore the main tourist destinations are on the coast in general, and cayes in particular. Evidence shows that as tourism is expanding, these sensitive and ecologically important areas are being subjected to escalating environmental degradation as a result. Although the incipient impacts are still localised, development patterns are not sustainable. Increasing unsustainable exploitation of mangroves can therefore be expected, especially as the preferred beach front land is increasingly occupied. In total, by 1990, 106ha of mangrove had been converted for tourism purposes. This mainly constituted small developments of a few hectares and less. Tourism developments are found across most of the coastal zone, including all three atolls. The majority however, are concentrated on Ambergris Caye, Caye Caulker and Placencia. In each of these settlements, there is evidence of elite involvement in the development process. This requires further analysis in Chapter 6 and 7.

5.6.4 The Rapid Expansion of Mangrove Reserves: The extent of mangroves in reserves has increased dramatically over the study period. Partly due to the designation of government sanctuaries, this has also been due to the creation of two private reserves set up by foreign conservation NGOs. These private areas are the most tangible form of the foreign conservation stakeholders' promotion of sustainable development in Belize. The characteristics of all the protected areas with mangroves are considered below, using information from LSD and FD records [20]. Their basic details are also given in Table 10 and their distribution in Figure 45.

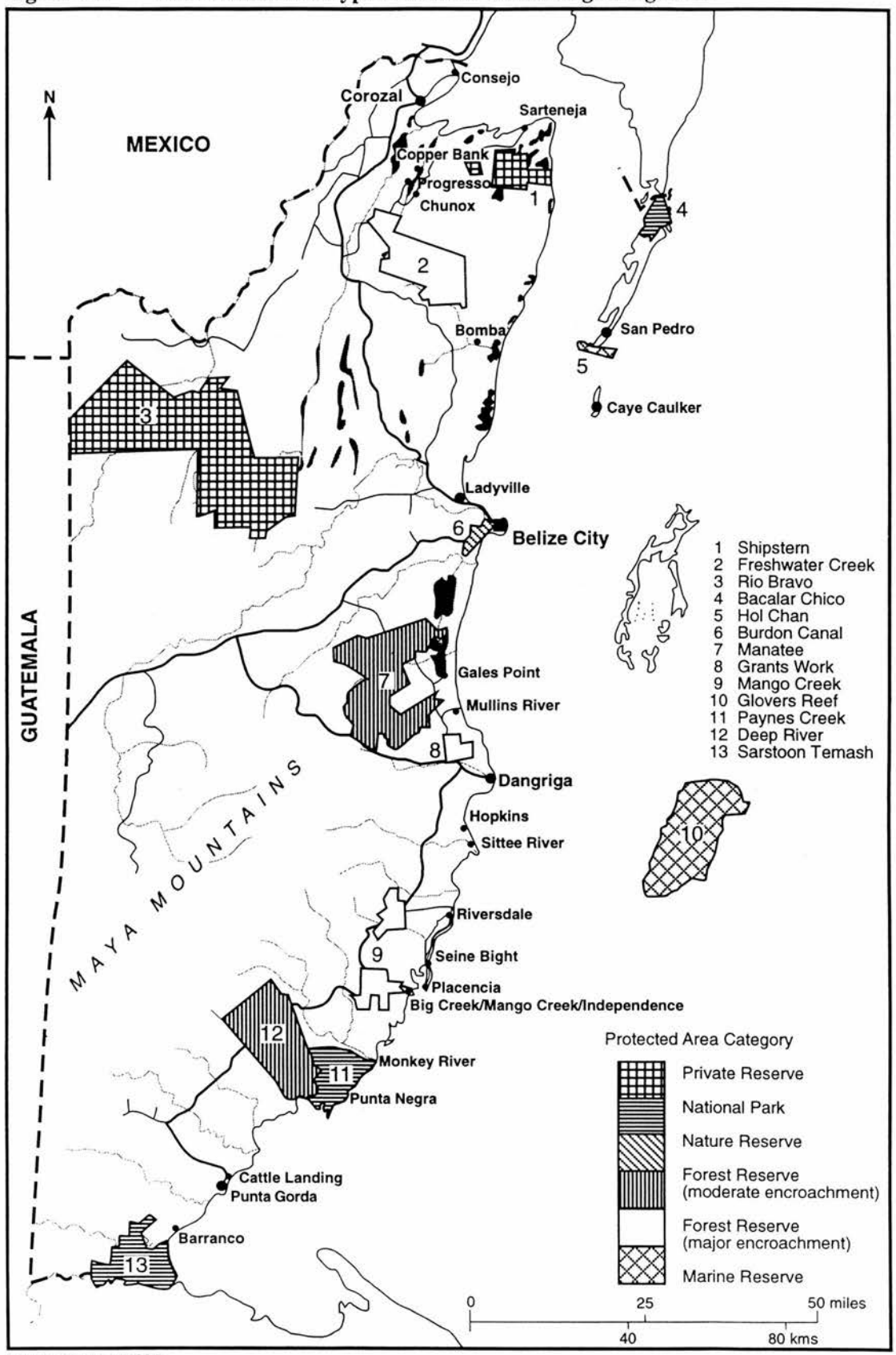
Table 10 Characteristics of protected areas containing mangroves

Reserve Type	Name	Designated	Area ha	(mangrove)
Forest Reserve	Freshwater Creek	1926	24,372	(1,812)
Forest Reserve	Deep River	1941	31,822	(1,411)
Forest Reserve	Grants Work	1941	3,202	(1,638)
Forest Reserve	Manatee	1959	42,071	(229)
Forest Reserve	Mango Creek 1, 2, 3, 4	1960	14,397	(194)
Private Reserve	Shipstern	1987	8,100	(6,140)
Private Reserve	Rio Bravo	1988	99,578	(n/a)
Marine Reserve	Hol Chan	1989	1,117	(2)
Nature Reserve	Burdon Canal	1992	2,128	(1,355)
National Park	Paynes Creek	1994	12,829	(n/a)
National Park	Sarstoon-Temash	1994	16,969	(n/a)
Marine Reserve	Glover's Reef	1994	32,901	(2)
National Park	Bacalar Chico	1997	3,749	(n/a)

Source: Zisman (1996). Mangrove areas are derived by over-laying reserve boundaries (where available) with 1990 mangrove coverage using GIS.

[20] During the research period, I undertook a contract for WWF-US to evaluate the status of Belize's protected areas. This resulted in The Directory of Belizean Protected Areas and Sites of Nature Conservation Interest (Zisman 1996). This section also draws from the analysis completed for this project, but adds mangrove-specific data.

Figure 45 Distribution and type of reserve containing mangroves



Source: Zisman (1996)

Reserve types and status: The first mangroves in protected areas were in Forest Reserves, set up between the 1920s and 1960s as part of the FD's forest management efforts. Five of the Forest Reserves on the coastal plain included mangroves as an incidental outcome of parcel boundaries. Therefore, although not an intentional mangrove protection effort, these protect 5,285ha of mangroves, equivalent to 6.7% of the 1990 national mangrove extent.

The next significant set of reserves are those designated for wildlife conservation. Through a sequence of FD designations, these have been responsible for the substantial increase in mangroves in reserves. These include Nature Reserves for strict protection and National Parks for conservation and recreation. The Burdon Canal Nature Reserve was designated in 1992 and was the first area protected specifically for mangroves. The three other reserves designated principally for mangrove protection are Paynes Creek, Sarstoon-Temash and Bacalar Chico National Parks.

The FD has responsibility for these sites and for Forest Reserves, but in all cases, it is too poorly resourced to carry out any management. It also became clear through the FD's mangrove patrols that leases were being given out by the LSD in three out of four of these sites. Given that these would have been sanctioned by the Minister of Natural Resources, the role of elites in the effectiveness of protected areas is examined in Chapter 6.

The mangroves protected in Marine Reserves is minimal, totaling only 4ha. This is because these sites are mainly for the protection of the coral reef. Both Marine Reserves are the responsibility of the Fisheries Department, who maintain an active management presence. In contrast to the FD, they have been effective in protecting the mangrove at these sites. The significance of this difference is also considered in the discussion in Chapter 6.

Finally, the study period has seen the creation of two private reserves. Rio Bravo includes mangroves growing 70km inland, fringing freshwater creeks and lagoons. It is managed by PfB, whose involvement in mangrove management has already been examined in Chapter 4. Whilst there evidently was elite involvement in the establishment of this reserve, it is not considered further because Minister Lindo's influence is better assessed by his role in the mangrove protection regulations. For Shipstern, the other private reserve, a far greater proportion of the site is mangrove. It was set up by the British owner of several butterfly houses in the UK, for the rearing of pupae to ship back for display. It was sold onto a Swiss

conservation charity, the International Tropical Conservation Foundation, in 1990, who then handed over management to the BAS in 1996. The reserve has been effectively managed throughout. There is no evidence of elite involvement in any of the reserve's history or current activities. What the creation of Shipstern does signify however, is a conservation organisation becoming a major coastal land owner, successfully combining eco-tourism, butterfly rearing and wildlife conservation. Out of all the protected areas containing mangroves, this has most effectively implemented sustainable mangrove use.

5.6.5 Aquaculture Impacts on Mangrove Habitats: The impact aquaculture has had on mangroves to date has been considerably mitigated by the availability of low-cost alternative land in the coastal savanna, just inland of the mangroves. This location does, in fact, represent a sustainable option for pond construction. This is used by one shrimp farm to advertise its 'green' credentials (see web site http://www.loki.com/~infobw/index2.html).

The siting of ponds on the savanna is firstly accounted for by the public status of the land. It was therefore cheaply available from government. Secondly, the savanna is better suited for the construction of ponds because it is underlain by clay. This is more suitable than the peat or calcareous marl that underlies mangroves because water is retained in the ponds, reducing filling costs. Aquaculture developments have also so far avoided pollution from the discharge of pond effluent into nearshore waters (G. Myvett, pers. comm. 1997).

Nonetheless, the impact of aquaculture on mangroves amounts to 180ha, including 1ha from the Taiwanese shrimp hatchery. As a proportion of the total area of mangrove cleared, this amounts to 8% and is therefore relatively significant. This is mostly from one farm at Indian Hill Lagoon plus the areas cleared by other operations for feeder canals, linking the ponds on the savannas to the sea.

The industry consisted of shrimp farms until 1997 (raising the Pacific White Shrimp *Penaeus vannamei*) when it expanded with the establishment of new operations. One farm raises Tilapia (*Oreochromis niloticus*) and the other Australian Red Claw lobster (*Cherax quadricarinatus*). The introduction of these exotic species has raised concern amongst environmentalists. For Tilapia in particular, experience shows that their escape and subsequent establishment in the wild can cause adverse disruption to native species.

Operators have tried to mitigate this by stocking the ponds with individuals of the same sex to stop them breeding if any do escape.

The Records from the LSD and company register show that the aquaculture operations are all foreign-owned (all US interests, except the lobster farm, which is British). Operators have not, with one exception, applied for permits to carry out the mangrove alteration, even though most of the 180ha has been carried out since the mangrove regulations came into force. Caribbean Shrimp Ltd. are the one exception [21].

Summary of mangrove impacts from aquaculture: A total of 180ha of mangroves has been cleared for aquaculture to date. Whilst still significant, this is a fraction of the area occupied by the growing-out ponds created. Furthermore, water quality monitoring shows that current operations are not generating significant pollution from their effluent. In these respects, aquaculture has followed a relatively sustainable development path. However, there are three points which point to the significant potential for this situation to change, and impacts on mangroves to increase. Firstly, had it not been for the PUP's election defeat in 1993, a major aquaculture project would have been given the go-ahead in mangrove to the south of Belize City (Belize Agro Industrial Development Ltd. 1993). This would have resulted in 40ha of basin mangrove being cleared for shrimp ponds, breaking the pattern of only using savanna for this purpose. Secondly, there has been considerable disquiet about the possible impact of exotic farmed species on nearshore ecology, in the event of their escape. The failure of the Fisheries Department to take control of this reflects their pre-disposal towards supporting the sector's unfettered growth. In turn, this is in line with government policy. Thirdly, the lack of co-operation over this issue and the failure of operators to obtain permits for the mangrove clearance that has taken place, indicates a willingness to over-ride environmental protection legislation. Therefore, despite the fact that the aquaculture sector has progressed to date in a relatively sustainable manner, this has largely been due to the availability of large tracts of state-owned coastal savanna.

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[21] Their application (No. 2) was refused because their lease had been canceled. Subsequently re-instated, they have failed to obtain a permit since. Application No. 16, from Ocean Adventures Ltd. was for a mariculture development, but this has not been implemented.

In terms of elite involvement itself, aquaculture operations do not currently entail the direct participation of Belizean elites, either as middle men, owners or operators. It will not therefore be considered further.

5.6.6 Transport Impacts on Mangroves: The area of mangroves cleared for the provision of transport infrastructure is high (144ha, or just over 6% of total 1990 clearance). The majority of this arises from the Burdon Canal and the Northern and Western Highways (see Figure 37). The Canal was constructed in the 1920s and the highways over the 1950s, well before the period covered by this study. These have no bearing on the current study, other than sustainable mangrove use dictates that a buffer be retained along the Canal to minimise erosion of its banks. This has in fact been the condition placed on permits granted for mangrove alteration on properties along the Western Highway, which extend back to the Canal. Field observations show that this is not consistently being complied with, and other developers who have not obtained permits are also clearing down to the Canal. It is unlikely, given these characteristics, that the Canal-side development will take place in a sustainable manner. The construction of the airstrip at Caye Caulker has been one of two more recent transport facilities to cause a significant impact on mangroves over the study period. It led to the clearing and filling of 4.3ha of basin mangrove forest. Elite individuals are implicated in its development, so it is examined in Chapter 7. The other is the clearance of riverine and basin mangrove for the port at Big Creek, from where Fyffes Ltd. export bananas to the UK.

5.7 Conclusions on the Characteristics and Sustainability of Mangrove Exploitation

The results from above have revealed the geographical characteristics of mangrove exploitation, its scale, impacts, the sectors and stakeholders responsible. It is evident that the great majority of mangroves, 98%, are in a natural or near natural condition. Of these, a significant proportion, particularly on the mainland, are in protected areas. Nonetheless, where exploitation is taking place, it has gone through a period of rapid escalation spanning the late 1980s to early 1990s. Principally, this has been to provide land for housing. This accounts for just over two thirds of the mangrove converted to date, if degraded mangrove, cleared and filled land in preparation for housing is included. In all the cases examined, the housing projects do not follow the guidelines necessary for sustainable mangrove use.

The other main causes of mangrove exploitation that have been identified are for aquaculture, tourism and transport infrastructure which account for a further fifth of all mangrove converted. Only aquaculture has so far, followed a sustainable form of development. It is not subject to elite involvement at present.

The main developments for 1988-1995, together with the elite stakeholder involved, are listed in Table 11. Underlining its significance, all but the last project is for housing.

Table 11 The major mangrove developments over the period 1988-1995

Location	Elite Person Involved	Description	Project
Vista del Mar, Ladyville	Javier 'Berbey' Garcia	Main PUP developer, party official, long-time friend of George Price, the PUP leader, and brother-in-law of Florencio Marin, Minister of Natural Resources	121ha private/public housing sub-division, including low income housing for PUP to hand out
Punta del Este, Mile 5 1/2, Western Highway Belize City	Arnaldo 'Pappy' Peña	PUP developer on the boarder-line of being in the political elite	101ha private housing sub-division, including low income housing for PUP to hand out
La Horizons, Corozal	Tony Castillo	PUP supporter and long-time friend of Florencio Marin, Minister of Natural Resources	*80ha private housing sub-division, targeting vacation and retirement market, as well as middle-class Belizeans
Dangriga	Zabaneh family	PUP supporters and major Belizean agro-industrial developers of the central coastal plain. Banana producers and part-owners of the port at Big Creek.	*12ha private housing sub-division, targeting vacation and retirement market, as well as middle-class Belizeans
San Pablo, San Pedro	Glenn Godfrey	PUP Minister of Tourism and Environment	*25ha GOB housing sub-division
Mile 8, Western Highway, Belize City	Florencio Marin	PUP Minister of Natural Resources	GOB housing sub-division. 333 lots. Surveyed in April 1993.
Mile 4 1/2, Western Highway, Belize City	Florencio Marin	PUP Minister of Natural Resources	GOB housing sub-division. 3.5ha. Surveyed in April 1993.
Belama Extension, Belize City	Javier 'Berbey' Garcia	See above	GOB housing sub-division clearing 45ha
Fabers Road, Belize City	Javier 'Berbey' Garcia	See above	45ha GOB housing sub-division
St. Martins, Belize City	Javier 'Berbey' Garcia	See above	39ha GOB housing sub-division
Hopeville, Punta Gorda	Mike Espat	PUP Minister of Agriculture and Fisheries. Friend of Arnaldo Peña	GOB housing sub-division. Surveyed Feb. 1992. 16ha.
Caye Caulker	Glenn Godfrey	PUP Minister of Tourism and Environment, Attorney and Land Owner	New airstrip, clearing 4.3ha.

* Approximate area estimated from site visit.

The distribution of these developments is clustered and therefore impacts are localised. This pattern of mangrove exploitation is producing a series of 'pressure points'. These are shown in Figure 46. Finally, drawing together all the analysis above, the stakeholders involved in the recent political ecology of mangroves in Belize are illustrated in Figure 41.

Figure 46 Distribution and type of development pressure on Belize's mangroves

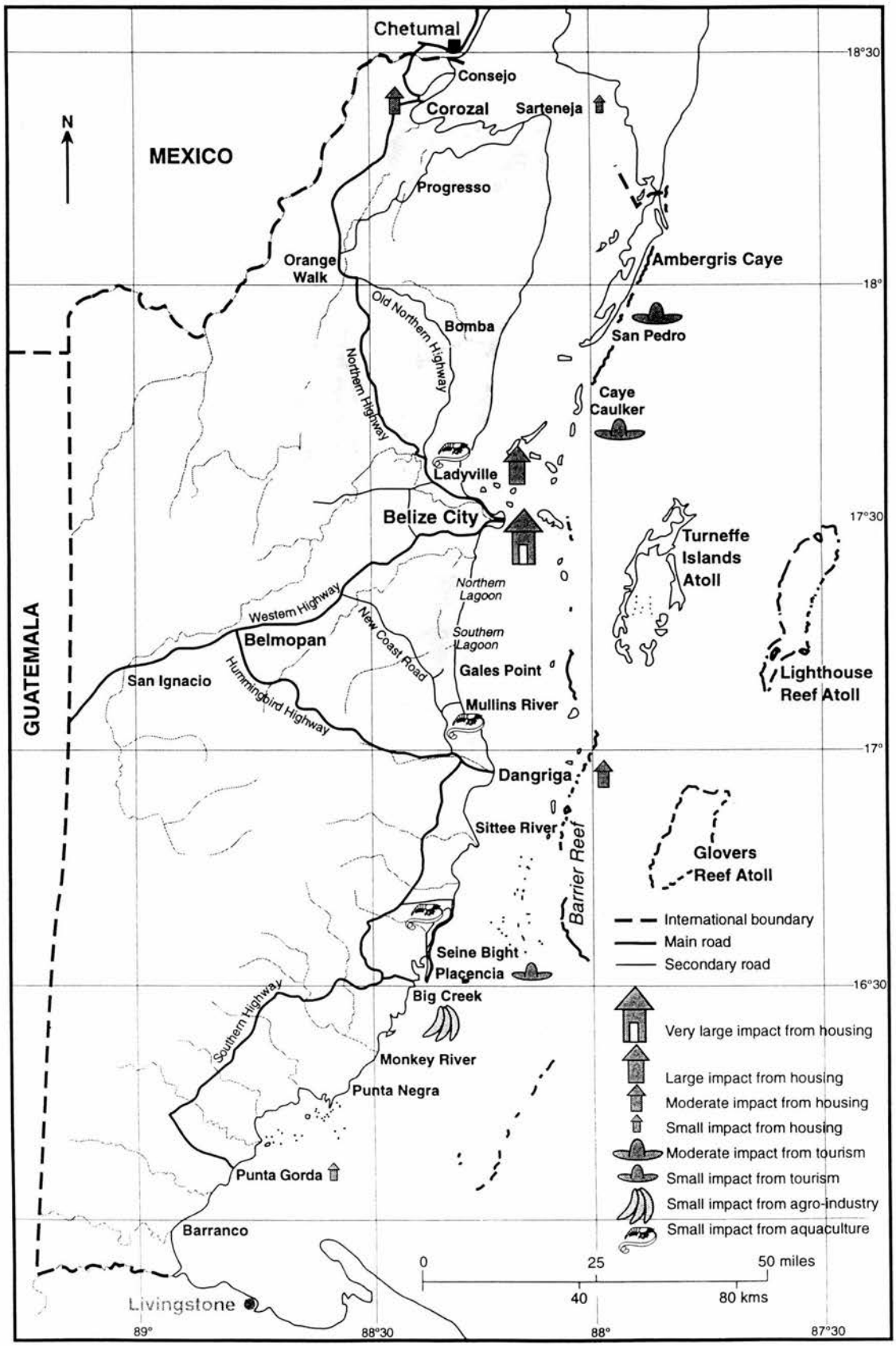
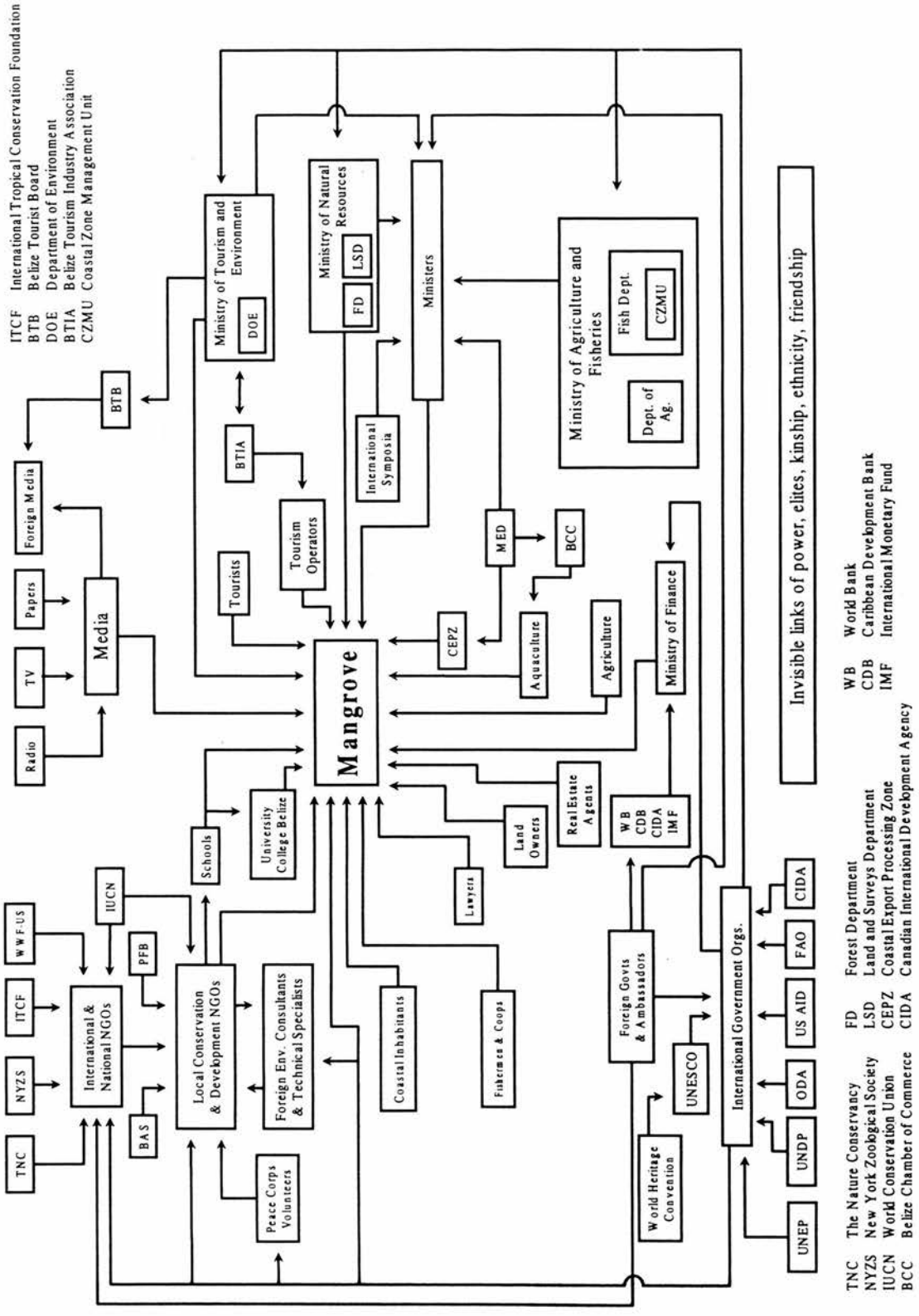


Figure 47 **The stakeholders recently affecting mangrove exploitation in Belize**



These are the forms of exploitation, their distribution, stakeholders and sustainability. These are also the preliminary indications of elite involvement in these patterns of mangrove exploitation. Chapter 6 now goes on to scrutinise in more detail the role of elite individuals in mangrove exploitation.

Elite Stakeholders and Their Impact on Mangrove Exploitation in Belize

6

The preceding research has examined the most prevalent types of mangrove exploitation in Belize and rarely found them to be sustainable. This chapter now specifically assesses the role of elite stakeholders in bringing about this situation. Included in this is an examination of their role in the failure of the mangrove regulations. The analytical approaches used for these purposes are primarily based on qualitative data.

The chapter is structured into two main parts. The first identifies the types of elite stakeholder that have been significant in undermining sustainable mangrove use, and their mechanisms and motivations for doing so. The second part evaluates why the mangrove regulations have failed to bring about more sustainable forms of mangrove use, distilling evidence for the elite influences at work. The research continues in the following chapter by evaluating the influence of the key elite individuals identified in particular developments where mangroves have been exploited.

6.1 The Identification of Elite Mangrove Stakeholders

6.1.1 Elite Types Identified: Research has revealed evidence for the following types of elite stakeholders influencing mangrove exploitation:-

i. the Ministers of Natural Resources,
ii. the political elite (Ministers, area representatives, senators) in tandem with the committees formed to allocate land leases (locally known as 'lots committees'),
iii. local councilors and local 'fixers',
iv. the lawyer/politicians and
v. the land developer elite.

By focusing on these most influential groups, this research follows the methodology of ODA (1995), focusing on the *principal* stakeholders involved. Therefore, in the discussion of evidence below, the focus is maintained on these most important groups, out of the range of the

broader range of stakeholders. The basic characteristics of elite mangrove stakeholders in Belize are summarised in Table 12.

Table 12 Types of elite and their interest in the exploitation of mangroves

Group	Sub-group	Interest in the exploitation of mangroves
Ruling elite	Minister of Natural Resources	- Maximising land to allocate for patronage - Accessing development and other aid - Generating personal income
Political elite	Ministers, Area Representatives and Senators	- As above
	Lots Committees	- Allocate public lots to applicants in accordance with members' and Ministers' requirements
	Local councilors and local fixers	- 'Fixer' for Ministers and other party officials - Serving constituent's needs - Generating personal income
Lawyer politicians	None	- Personal profits - Protection of personal interests by influencing law formulation and prosecution/enforcement - Serving the interests of clients either directly in court or indirectly by influencing events related to prosecution/enforcement before court is reached
Developer elite	None	- Personal profits - Helping other allied elite individuals and groups - Securing preferential access to resources from ruling elite

By way of a last introductory observation on these individuals, the sources of power they evidently use in their control over resource use are listed in Table 13. These attributes enable elite individuals and groups to act in the way that they do.

Table 13 Sources of power and influence over mangrove resources in Belize

Formal
Legal authority
Hierarchy of organisation
Managerial control of resources
Possession of information
Possession of specialist knowledge
Negotiating position in relation to other stakeholders
Political status
Informal
Social status (reputation, respect, myth)
Economic status (ability to provide resources to clients, through patronage)
Links with other elite stakeholders (kinship, friendship, cadré connections, group loyalty)
Leverage over other elites (party contributions, bribery)

6.1.2 The Ministers Responsible for Mangroves: During the period under consideration, evidence is clear that out of the ruling elite, the Ministers for Natural Resources were the most

significant elite individuals in guiding the path of mangrove exploitation. Of the three in office during the study period (Table 14), the PUP Minister for Natural Resources, Florencio Marin, has had greatest impact.

Table 14 The Ministers responsible for mangroves 1989-1995

Position	Name	Party	Date in Office
Minister of Agriculture and Fisheries	Dean Lindo	UDP	1984-1989
Minister of Natural Resources	Florencio Marin	PUP	1989-1993
Minister of Natural Resources	Eduardo Juan	UDP	1993-present

In addition to over-seeing the FD, the institution responsible for mangrove management, Marin's position as Deputy Prime Minister gave him extra responsibility for government policy on resource development. It also gave him access to a substantial range of state and party resources with which to pursue his particularistic and universalistic objectives. In both realms, his Mestizo working-class background accounted for the bullish attitudes he displayed in regard to development priorities and practice. Despite originating as a teacher, he showed a strong respect for business people and a disdain for bureaucrats and technicians, with the result that the latter two groups were repeatedly marginalised in the decisions concerning resource use. Furthermore, conservation was regarded as something of an obstacle to development, and imposed by foreign concerns (Respondents 5, 13 and 3). Overall, these characteristics are 'typical of the Mestizo mind-set and typical of most Mestizo business people' (Respondent 13) [1]. The approach he evidently took in relation to mangroves, as well as his other responsibilities, is reflected in his personal 'motto', taken from biographical notes in the National Archives (MC-338). This exhorts 'No man survives without land, and no land flourishes without man'. The outcome of these beliefs in relation to mangroves was his collusion in the choice of area in which to accommodate Belize City's housing demand. Given the major impact this had on recent mangrove exploitation, Marin's role in this decision, in combination with his elite partners, is examined in detail in Chapter 7.

The second Minister of interest for this research is Dean Lindo. He was Minister of Agriculture and Fisheries under the 1985-89 UDP administration, at the time when it contained the FD. His role has already been examined in Chapter 4, in relation to the introduction of mangrove protection regulations. The only point to note here is that, in contrast to Marin, Lindo heralds from the Creole upper-class, is university educated and professionally qualified (also see the lawyer/politician category below). This makes him more in tune with the ideology

[1] Mestizo is the ethnic group a person of mixed European and Maya Amerindian ancestry.

of state intervention in business affairs, and with the objectives and functions of planning and conservation.

Finally, and most recently, Eduardo 'Dito' Juan is Minister for Natural Resources under the current UDP administration (1993-present). As a Mestizo businessman, he has more in common with Marin, but has consistently pursued more particularistic goals. This has caused considerable friction within the FD, and between the Ministry and ODA. Where Juan's activities have affected mangrove management, details are covered below, in the analysis of the FD's operation as a mangrove stakeholder.

These men from the ruling elite are the most significant figures in the outcome of mangrove exploitation in Belize. The sections below elaborate on their precise influence and how it has been brought about. They also identify the other elite groups with whom they are associated and who are also involved in carrying out the type of mangrove exploitation that has been emerging over the late 1980s and early 1990s.

6.1.3 'If I wan' piece of land, I have to go an' beg' [2] - Patronage and the Political Elite: A consistent pattern of behaviour by these Ministers and associated members of the elite has been their resistance to relinquishing control over the allocation of state-owned land. Experienced in relation to *mangrove management* (Respondents 4, 26), *rural land use planning* (Respondents 5, 8, 11) and *urban land use planning* (Respondent 28), the evidence below shows that this is accounted for by the role of land in patronage. This function underlies their resistance to sustainable and rational resource use in Belize. The structures and motivations behind this are now examined in order to explain this opposition of the political elite to interference in the use of mangroves on state land.

As Chapter 5 identified, the need for housing as the main cause of mangrove clearance. Therefore, the influences on government land allocation for housing need to be identified. Evidence is therefore considered to identify the socio-political forces associated with the housing process. The main structures the political elite use in this process are the politically-appointed 'lots committees'. Set up by the ruling party where land is in demand, they vet applications to lease national land. Applications that are approved are passed to the LSD for

[2] Comment from Belize City resident (pers. comm. 1996)

processing. The Minister of Natural Resources also maintains a weekly 'surgery' in Belize City and Belmopan, where people wait, sometimes taking several visits, to see him to request a lease. However, because demand has grown to such an extent, it has become impractical for the Minister to oversee the process personally. Therefore the lots committees exercise this political vetting elsewhere around the country [3]. Committee members comprise loyal party supporters, and will often be chaired by the party's area representative or senator [4]. Carlos Diaz, PUP Minister of Energy and Communication (1989-93), for example, was the PUP area representative for Lake Independence. He took a major role in initiating the Lake Independence sub-division project and also in house lot allocation (Respondent 10). Diaz maintained an office on site, staffed full-time by his wife, where constituents queued to get their lease. This entire development is in mangrove, and despite the fragility of its riverine northern fringe, no mangrove buffers were allowed for in the layout of the lots (Respondent 3). Another example was Ralph Fonseca, Minister of State for Finance in the PUP's 1989-1993 government. He was Chairman of the Ladyville lots committee. Subsequently, for the 1993 election, a new constituency was created (Belize Rural Central), encompassing Ladyville, for which Fonseca became the successful PUP candidate. In his role as lots committee chair, he had been 'buying' support through the distribution of national land, including mangrove areas.

'He who controls the land, controls our destiny [5]' - the critical importance of land allocation: This type of patronage process and the role of the 'lots committees' are absolutely central to the understanding of natural resource exploitation in Belize, and will be repeatedly highlighted as instances arise. In overall terms, the use of land in this patron-client relationship results because other forms of resources under the control of the ruling elite (for example money, jobs and equipment) are in short supply. The allocation of national land is therefore the main 'capital' by which the political elite advance patronage. The land is granted, and five annual rental payments are made (effectively a hire-purchase agreement), after which the property becomes freehold. In this way, State land is distributed at less than 5% market value but affordable to the majority of potential clients. Any form of environmental management that diminishes this patronage 'capital', by designation of reserves for example, or by leaving

[3] Bearing in mind that when Marin, for example, first had responsibility for leases, as Minister of Agriculture and Lands in 1974, Belize's population was only 120,000. With limited economic growth, and by dealing with 10 applications a day, he would have easily been able to oversee the demand personally.

[4] The position of 'senator' is a nominal one only, but nonetheless, still holds considerable power. It is the title given to a candidate of the ruling party in a constituency won by a member of the opposition. In these circumstances, these individuals still carry the weight of a member of the ruling elite, with its associated benefits, and can draw on state resources for patronage.

[5] Editorial heading from the Amandala (6th July 1993).

mangrove buffers, is anathema and untenable, when there are constituents to be 'retained'. This is because, for the people in power, such measures bear too great a political 'opportunity-cost'. It is extremely significant therefore, that the majority of mangroves are state owned, and that land in these areas, especially around Belize City, is in demand for housing, tourism, aquaculture and other commercial development. This relationship explains why interference in the political elite's land allocation process is vehemently resisted, even by other departments in the same Ministry. Observed repeatedly whilst working for the FD, the CFO's efforts to guide the LSD's land allocation to allow for a measure of mangrove protection, were rebutted by senior bureaucrats, through delay, decision-making he was not party to, or not notified of (Respondents 1, 3, 5, 8 and 10).

The main point to recognise here is the orientation of the political elites' actions, and consequently, the institutions, notably the LSD, which operate in their service. The LSD's function is not, as might be expected, to rationally allocate land according to its suitability, an approach that would have matched the basic tenet of FPMP's land use planning objectives. As Respondent 11 repeatedly emphasised, 'The Ministry is there to serve the Minister, not the other way round', i.e. the role of the public bureaucracy, in practice, is to serve the *private* and *public* objectives of the Minister, his colleagues and his party. Given the importance of land in securing patronage, the LSD and the lots committees are the institutional resources used by the political elite to administer the allocation of land for patronage. Also, given the role and autonomy of the Minister for Natural Resources, who has ultimate responsibility for land, the balance with which these resources are used to pursue between private and public objectives very much depends on his needs. This has come to the fore with the high degree of private benefits that Dito Juan has pursued as Minister (Respondent 1, 9, 13, 21).

6.1.4 The Political Elite as Developers: The second notable form of impact from the political elite is achieved through their direct involvement in property development. Whilst relatively rare over the study period, nonetheless two significant cases were identified. The first, and that affecting the greatest area of mangroves, involves Glenn Godfrey, the Minister for Tourism and Environment in the PUP's 1989-93 administration (also see the lawyer/politician category in Section 6.1.6). As already highlighted, Godfrey owns property on Caye Caulker and is also the local agent for the US-backed development of the Pinkerton Estate, an 8,910ha property on northern Ambergris Caye (Respondent 3 and 14). Both areas fall within his Belize Rural South constituency and are important to the outcome of

mangrove exploitation. Firstly, they include significant mangrove areas and secondly they open up adjacent mangroves to development. Given Godfrey's importance, the Caye Caulker case will be examined in Chapter 7.

Godfrey's wife, it is also perhaps worth noting, was Director of the BAS at the time he held office. He was also closely involved with the Director of the Belize Tourist Board at the same period, when it hosted the 'Destination Mangrove' conference. From these personal links at least, he would seem to have plenty of exposure to conservation ideology, but in practice, as shall be illustrated, it does not appear to have influenced his actions in relation to coastal development.

As already referred to, the second Minister with development interests is Henry Young, also Minister for Tourism and Environment, but for the UDP (1993 to present). Between 1990-92, whilst the area representative for Port Loyola, Belize City, he was active in two mangrove projects, one at the end of Placencia peninsula, the other on Placencia Caye. In this latter case, he was acting as the local agent for its American owner. Both developments were dredge-and-fill sub-divisions for holiday homes and were entirely in mangrove environments. Whilst the Placencia Caye development did not come to fruition, the first project resulted in the clearance of just over 4ha of fringing mangroves (see Plate 17).

Examinations of the applications for mangrove permits reveal that Young submitted four applications, three of which were in advance of clearance starting. One of the four, the development of Placencia Caye, was also accompanied by an Environmental Impact Assessment. From this evidence, and the associated applications to sub-divide the land, Young therefore demonstrates a relative openness to environmental regulations, and willingness to follow legal requirements. In this respect, neither he, nor his legal representative in these projects (Young's Law Firm) have evidently used membership of the political elite to side-step environmental regulations [6].

6.1.5 Local Government and Local Fixers: This section specifically examines the role of *local* politicians to assess their role in mangrove exploitation. What it reveals is that in certain circumstances, these individuals act as agents for senior members of the ruling elite, by promoting the latter's private objectives.

[6] The relevant mangrove permit applications are numbers 15, 17 and 27 for the south end of Plancencia Peninsula, and 25 for Placencia Caye. The associated sub-division application numbers are 357 and 526 for the Peninsula and 750 for the Caye.

Local government is well established in Belize, but relatively devoid of control over any meaningful resources. Therefore, members of the Belize City Council, the Town Boards and the Village Councils have few independent resources at their disposal and occupy a lower tier of the political elite. Provided they are of the party in power, they do however, get access to state resources through their senior political colleagues. When this is not the case, the ruling elite will block their initiatives.

When aligned with the ruling politicians, the local politicians act as local agents for the ruling elite. The relationship is mutually important, because in this way, the latter can maintain an influence in local politics. Resulting allegations of Ministerial interference in local elections are therefore commonplace. Most notably in respect of mangrove exploitation, it is widely reported that Tourism and Environment Minister, Glenn Godfrey, in his capacity as their area representative, played a significant role in the Caye Caulker and San Pedro local elections (e.g. Belize Times 26th June 1993:18). In doing so, his objective was to ensure that a pro-development caucus was elected, so that a more commercial development path was followed, instead of the more restrained 'eco-development' approach favoured by the majority of residents and tourism stakeholders (Respondent 4). As already highlighted, the fact that he has land and business interests in both areas would provide a valid explanation of his involvement.

In these circumstances, the actual activities of these local government representatives centre on identifying potential opponents and taking necessary actions to weaken or remove any obstacles to the desired actions of the ruling elite. Putting pressure on other council members, spreading rumours to undermine the opponent and getting trading and other licenses withheld are common examples of their actions. This type of activity is most prevalent in San Pedro and Caye Caulker, where protagonists of the 'big' versus 'small' development approaches are most polarised (see, for example, The Belize Review. July 1992, p. 20). This issue is examined in Chapter 7 in relation to Godfrey, the Caye Caulker Village Council and the island's development pattern. From the evidence evaluated, these local agents can be important influences in helping to determine the dominant form of mangrove exploitation.

As described in Chapter 2, membership of different elite groups is not mutually exclusive and certain individuals can maintain membership of more than one. Two such cases have been identified that have a significant role in mangrove use. These are considered next.

6.1.6 The Lawyer/Politicians [7]: Examination of this group is necessary because they form the core of the political elite, and therefore have over-riding power to influence resource exploitation. Although a defensive and cohesive group when their mutual interests are challenged, as should be anticipated by now, this group divides down party-political lines into two 'camps'. There are the PUP attorney firms (e.g. Young, Barrow and Lois & Co., Glenn G. Godfrey & Co. Musa & Balderamos, W. H. Courtenay & Co.) and the UDP ones (e.g. Pitts & Elrington, Lindo, Barrow and Williams).

In relation to mangroves, the operation of lawyer/politicians is critical, with two important features affecting exploitation. The first arises out of Belize's adoption of an economic strategy based on foreign investment. Observations, contacts and evidence from sub-division data show that early on in their development projects, foreign investors usually engage an attorney when starting business in Belize. On the advice of their embassies, local contacts or the Belize Chamber of Commerce, they choose a law firm affiliated to the party in power. Therefore, as a side-effect of the increasing number of investors present under this economic strategy, the legal elite has benefited from a corresponding increase as local representatives in development schemes. In essence, the attorneys have become stakeholders in the free-trade development strategy, in the service of foreign clients' unfamiliar with local procedures. This generates greater fee revenue, and significantly, given the wealth of many of the lawyer families, also creates openings for their own personal investments. As Respondent 11 described it,

> 'They are like spiders in the centre of a web. They just have to sit there and feed off what comes to them'.

Highlighted in an equally colourful way, an editorial described these individuals as 'a wealthy and powerful fixture on the skyline' whose profits from 'land deals were fabulous' (Amandala, 27th March 1992:2). The consequence is that this elite group has a vested interest in pushing through projects, and over-riding, avoiding or ignoring environmental (and other) regulations that may reduce profits or cause delay (Respondent 5, 11, 15 and 16). There is also written evidence for example, of a law firm advising clients that environmental permits would be 'seen to', and that developers should, in the meantime 'just go ahead'. This particular case occurred

[7] This term was first coined by Glen Tillett, the editor of the weekly Amandala newspaper in Belize. It has been adopted here as a suitable title for this elite group.

in relation to a mangrove permit for an American developer on Caye Caulker [8]. As an LSD official (Respondent 19) lamented,

> 'You'd think these lawyers, from these big families, at least would be patriotic and keep our laws. But they don't. They'll do anything for money'.

Clearly, here is evidence that one type of elite is behaving in a way that inhibits the effectiveness of environmental legislation such as the mangrove protection regulations. Their motivation is personal profit, plus, wherever possible, benefit to their party from 'initiating' development projects.

The second reason that the legal elite is so important for resource exploitation, which also accounts for the desire of investors to engage a law firm 'in power', is that a cadré of the practicing attorneys also belong to the top echelons of the ruling elite. Their precise composition obviously depends on the party in power. In the 1985-1989 UDP administration, Dean Lindo, a partner in the law firm Lindo, Barrow and Williams, was also the Minister for Agriculture and Fisheries (his role has already been discussed in Chapter 4). In the 1989-93 PUP government, Glenn Godfrey continued his law practice, was area representative for Belize Rural South (including Caye Caulker, Turneffe Atoll and Ambergris Caye), was Attorney General and also held the post of Minister for Tourism and Environment. This was precisely the period when the PUP took a stronger role in promoting the tourism sector [9]. In the current UDP administration, Dean Barrow (Dean Lindo's nephew), of the practice Barrow and Williams, is Deputy Prime Minister, Minister for Foreign Affairs, Economic Development and the Attorney General.

By retaining their services, developers can get easier access to state-owned natural resources, and state-controlled development rights. Business people are therefore extremely keen to work with one of these individuals, and court their co-operation. Evidence of this impact is obviously difficult to obtain because it is well-hidden and the individuals can hide behind a cloak of 'client confidentiality', even if called to account in the public domain as elected figures. Nonetheless, share holdings in new companies, or parcels of land in sub-divisions, are

[8] The relevant mangrove permit application is number 13.

[9] Since the UDP's return to power in 1993, Godfrey law firm specialises in services related to offshore trusts. For further information on the nature of this sector, readers are referred to Mark Hampton's 1996 article on the interface between offshore finance, economic development and corruption.

widely considered the normal currency developers use to engage this role as facilitator. Neither can, however, be checked because (i) despite the legal requirement to do so, less than 10% of the 130 company registers examined had the shareholders listed, and (ii) the land records are too poorly organised for it to be practical to search for particular individuals obtaining land. Again though, this type of business relationship reinforces the power of the lawyer/politician elite 'at the centre of the web' and encourages them to take a rigorous pro-development stance.

Finally, what is significant but harder to assess, is the power which lawyer/politicians derive from their unique access to, and control of information. Operating in both domains, they can access and use commercial insights from their professional activities and state information they are party to as members of Cabinet. One significant outcome is that details about developments in which these individuals have a stake, including those affecting mangroves, are withheld from the regulatory authorities. The CFO and coastal zone management staff repeatedly complained that the first they would know of projects (including government housing sub-divisions in mangroves) would be when workers were observed clearing the site. In these cases, Respondent 2 explained

> 'What can we do? By this stage it's just too late. Then when we try and intervene, they complain it's too late to change their plans, that it would cost too much, that too much money has already been spent. Then they threaten to demand compensation. It's hopeless!'

The point is that by withholding information, and by leaving it for the environmental regulatory bodies to belatedly find out about projects, these elites and their developer clients know that enforcement of measures are undermined and can more easily be re-buffed.

This 'double domain' accessible to these 'super-elite' allows them to use the widest possible sets of resources to pursue both their individual and public objectives. To fully understand the implications of this, their activities must be considered in the context of Belize's neo-liberal doctrine, which puts the government as development facilitator. Business people encouraged to come to Belize, must go through various legal steps (e.g. company registration) that usually entail retaining an attorney. The lawyers, in this respect, serve a legitimate professional function, and simultaneously, 'on behalf of' this development ethos, set about 'fostering development', 'assisting' investors, providing land, granting development concessions and

issuing licences. Clearly, in this framework, they are empowered to guide the path of development. Glenn Godfrey, more than any other of this small group, has had a significant impact on mangroves because of his business interests in coastal developments.

6.1.7 The Land Development Elite: Having considered the lawyer/politicians, it is now possible to assess the importance of the other dual elite identified. This is a small but critical group of businessmen, entrusted with the drainage and filling of mangrove areas to meet demand for housing, commercial and other development. They are politically well-connected, and achieve their status through the perceived or proven ability to implement large public and private developments. They get assistance in various facets of their development, generate personal profits and ensure continued intra-elite support by returning some of the benefits, either in the form of developed lots to allocate to party supporters (through the lots committees), or as donations to party funds (Respondent 3, 13 20). It is a type of mutually beneficial arrangement which Belizeans talk of as 'hand wash hand'.

The two principal members of the developer elite in terms of mangroves affected are 'Don' Javier 'Berbey' Garcia, and Arnaldo 'Pappy' Peña. The role of Garcia, as the main individual in this group, will be considered in greater detail in Chapter 7, so little more will be said here. Others include Luke Espat (PUP), Salvador Habet (UDP) and Tony Castillo (PUP). The main point to emphasise though, is that through their political connections, they are able to access state-controlled resources free or at cheaper rates than would otherwise be the case. Critically, this generates a 'false economics' which brings on-stream projects that would otherwise not be economically feasible. As a result, and perfectly demonstrated by Peña's unsuccessful developments, under-capitalised projects go ahead, with considerable impact on mangroves, that would otherwise not proceed if they had to be instigated at normal cost. As just one example, commercial banks would require realistic projected profit/loss projections before loans would be extended. However, the resources accessed by virtue of their intra-elite connections allow them to proceed with projects regardless of their likely success. In Peña's case, following the digging of drainage canals and clearance of 101ha of basin mangrove, the project came to nothing.

The type of resources available to these developer elites are large areas of land, the use of government machinery and work crews, removal of customs duties, and, in certain cases, finance. Evidence for this regularly appears in the media, as the result of politically motivated

leaks. One example is the case of Dangriga's Councillor Webster allegedly using Town Board machinery to fill his mangrove property (Belize Times, 17th March 1996:2). In another example, from a review of the LSD Surveyors Job Book, it is clear that Luke Espat, a key PUP supporter who moved into construction during the property boom of the early 1990s, had LSD staff survey his (12.9ha) private property in March 1993. As explained by several Belize City residents during conversations about their land, it is precisely the cost of having a survey done which stops them converting their lease into freehold property. Yet, 'them big boys get government to do it for nothin'.

Finally, one further generic characteristic of this group is noteworthy. Mentioned on numerous occasions by Garcia and other developers, was their notion that development in mangroves was 'a challenge'. There are two elements to this. The first motivation is personal satisfaction. As the wife of one of Belize's most wealthy businessman put it

> 'If you tell my husband 'It can't be done' he'll go right ahead and do it.
> He loves a challenge!'.

In this particular case, the land she was referring to was an overwash mangrove caye on Lighthouse Reef, converted by her husband into a small tourist resort. The point is that such people are already successful in their field. Mangrove development presents a new challenge and therefore has an extra appeal. This somewhat unexpected motivation was encountered repeatedly with elite and non-elite developers. Since all were men, there is also a degree of *machismo* in operation, and the challenge is seen as 'taking on' nature. The second element, evident in discussions with Garcia and other developers, is motivated by the desire

> 'to serve my country, by turning wasteland into something useful, to give
> people somewhere to live'.

Again, this is an important characteristic that helps to explain why mangrove areas are chosen for development above other options. It also explains why mangrove clearance escalated so rapidly in the early 1990s, because a cadré of developers appeared with this attitude but also with the willingness to take on the challenge of mangrove development (Respondent 11). This is an example of the 'highly contingent' nature of resource exploitation referred to by Scoones (1997), noted in Chapter 1.

6.1.8 Summary of Elite Characteristics and Motivation: These are the salient characteristics, structures and motives of elites influencing mangrove exploitation. By virtue of their position, these individuals have a range of resources at their disposal. They manipulate these to secure private benefits, followed by benefits to their party, clients, constituents and the wider public. Patronage is the most widespread form of socio-political interaction used to interchange these benefits.

All the elite types identified have an interest in the promotion of rapid economic development. This generates greatest opportunities for private accumulation and maximum, immediate benefits to disperse to supporters. Given the dependence of Belize's economy on the primary sector, this development generally features some form of resource exploitation.

Sustainable forms of mangrove development inhibit the elites' fulfillment of both their economic *and* socio-political objectives. Consequently, elites' receptiveness to mangrove protection measures is, in practice, extremely limited. They neither trust nor respect conservationists, technicians and bureaucrats, and are unwilling to delay projects so they can be more carefully planned. Such are the generic characteristics identified to date that predispose the elite's resistance to sustainable mangrove use.

Having elaborated on the general characteristics of their involvement, this investigation continues with the scrutiny of the elite's impact on two components of the strategy for achieving sustainable mangrove use, namely the mangrove regulations and protected areas.

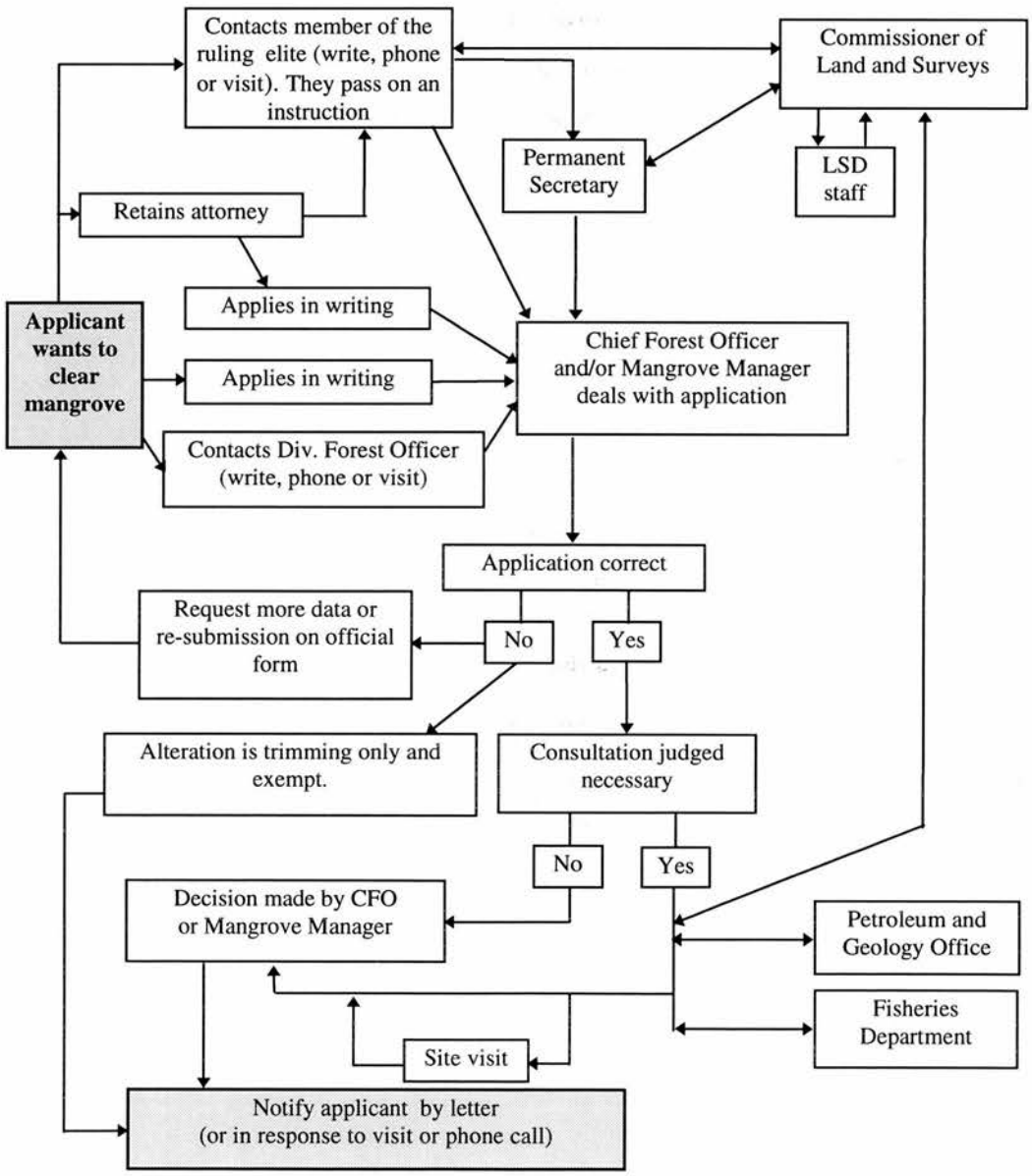
6.2 Why Have the Mangrove Regulations Failed and Are Elites the Cause?

Having examined the emergence of the mangrove protection regulations in Chapter 4, Chapter 6 proceeds with an analysis of elite individuals' involvement with the actual *implementation* of the mangrove protection regulations. By comparing the 'promise' of sustainable mangrove exploitation with the actual 'practice', the purpose is to identify any further evidence of elite influence, motivation or structures affecting mangrove use. In all, five types of elite influence have been identified that are partly responsible for the regulations failure to achieve more sustainable forms of mangrove exploitation. Other causes are also recognised that do not arise from elite interference. The section firstly identifies how the permit applications have been administered.

Data Sources: The review procedure for the permit applications has been described in the previous chapter. Emphasis here is on their administration and enforcement, and the information this reveals about elite and other stakeholders. Insights were therefore gained from participating in mangrove management at the FD and during subsequent fieldwork. Over this period, information was collected through discussions with the FD and Ministry of Natural Resources staff. These included senior FD officials and technical staff and the Permanent Secretary and Commissioner of Lands and Surveys, since they also had a significant input into the direction and vigour of the legislation's implementation. To also cover the applicants' perspective, discussions were also held with several permit applicants.

6.2.1 Elite Influence in the Permitting Process: The official and unofficial approaches identified for obtaining a mangrove alteration permit are shown in Figure 48.

Figure 48 Application Process for Obtaining a Mangrove Alteration Permit



These investigations revealed that individuals wanting to alter mangroves, who were also able to engage the services of a member of the ruling elite, used this avenue to ensure the permit was obtained, or speeded up. In these cases, the elite individuals either extended assistance simply as a favour, or as patronage, or to secure a share in the development. Following the intervention of the elite individual, the CFO is compelled to follow his/her instruction, and the awarding of the permit is henceforth a formality. Evidence for this comes from the case of Orange Point Marina, just to the south of Toledo, where the area representative, Mike Espat, Minister for Agriculture and Fisheries, was collaborating in a marina project with an American investor. The CFO had been faxed the application, which in itself was incomplete. Despite the normal procedure of completing a site visit to assess the alteration impacts, pressure was applied by Espat to get an immediate response. The site visit had been scheduled for mid-May, jointly with the other permitting agencies (Fisheries Department records). However, the same afternoon that the FD received the application, Espat phoned the CFO five times to insist on the processing of the permit. The CFO had no alternative but to respond, and it was issued and faxed (E. Green, pers. comm. 1995). Consequently, by the time FD staff visited the site, permission had already been awarded to clear 3.6ha of mangrove.

Clearly, once allied to the project, the Minister with responsibility for fisheries could not be seen to ignore mangrove legislation. However, through exerting his elite influence, he ensured that no impediments were put on the development in order to protect the environment.

This was the most blatant form of political interference identified out of all 101 applications. What also became clear though, and accounts for the absence of other cases, is that politically-connected developers did not generally feel it necessary to even apply for a permit. This was the case for Peña for example, when he embarked on his Punta del Este development, at the time the largest mangrove clearance ever to take place. According to the CFO, no effort was made to get him to comply because 'it was a political thing'. The implication here is clear, that as a member of the developer elite, Peña did not have to bother applying for a permit. Therefore, in respect of cases where applications for permits were requested, and also where they were not, there is clearly an elite influence at work that reduces the enforcement of the regulations.

The ruling elite and the FD's human resources: In this respect, two distinct examples of elite influences have been identified that affected the FD's capacity to carry out its mangrove (and other) duties. The first relates to the number and productivity of staff and the second to their deployment.

The FD's low staff numbers appeared entirely to be a reflection of the public sector budgetary cuts instigated during the 1980s at the behest of the IMF. However, evidence shows that this does not entirely account for this shortage. Evidence emerged in the wake of the UDP's victory in 1993, when three new staff were appointed at the Conservation Division to serve under the Principal Forest Officer, Richard Belisle. It became evident, as Belisle moved his office into the one adjoining 'Dito' Juan's, that his role was to be this Minister of Natural Resources' personal assistant. Belisle evidently represented an example of the bureaucratic elite referred to in Chapter 2.

'Dito' had arranged for the three positions to be created to give Belisle greater resources to work with on their own personal activities (Respondent 1, 11, 22). It also enabled the Minister to 'give away' the posts to his supporters, in a form of patronage that is common in most developing countries' bureaucracies.

In this light, the staff shortage in the FD needs to be reinterpreted. They are not just the result of budgetary restraints. The staff shortage which had significantly reduced the FD's capacity to implement the mangrove regulations was the result of the low priority afforded to the FD by previous Ministers. However, when a senior figure like Belisle was also a personal friend of the Minister, the supposed obstacles to personnel increases were overcome. The three new workers in fact, represent a 33% per cent increase in the Conservation Division's staff allocation.

Logically, this should have produced a stronger institutional force. That this was not the case arises from the fact that the individuals concerned were political appointees and therefore did not have to work to ensure their continued employment (Respondent 22). Their time 'at work' was consequently spent reading the newspapers or playing cards (pers. obs.). That fact that they lacked the suitable qualifications in any case was another consequence of the ruling elite's interference which diluted the FD's technical capacity. Furthermore, their presence also has a knock-on effect, in that it is demoralising for other staff who are already

over-stretched to share an office with people who do nothing yet are beyond reproach. Also, since the CFO had been by-passed in the appointment of these individuals, their presence added one further element to the acrimonious internal power struggle between the CFO and Belisle (supposedly his junior). This 'smouldering conflict' within the FD, diverted both individuals away from their departmental responsibilities, which, in relation to mangrove management, included their absence from meetings and workshops and delays in dealing with correspondence (Respondents 8, 21 and 26). Overall, the role of the Minister and Belisle in creating these posts therefore represents a major contributory factor to the FD's inability to effectively carry out its functions, including mangrove management.

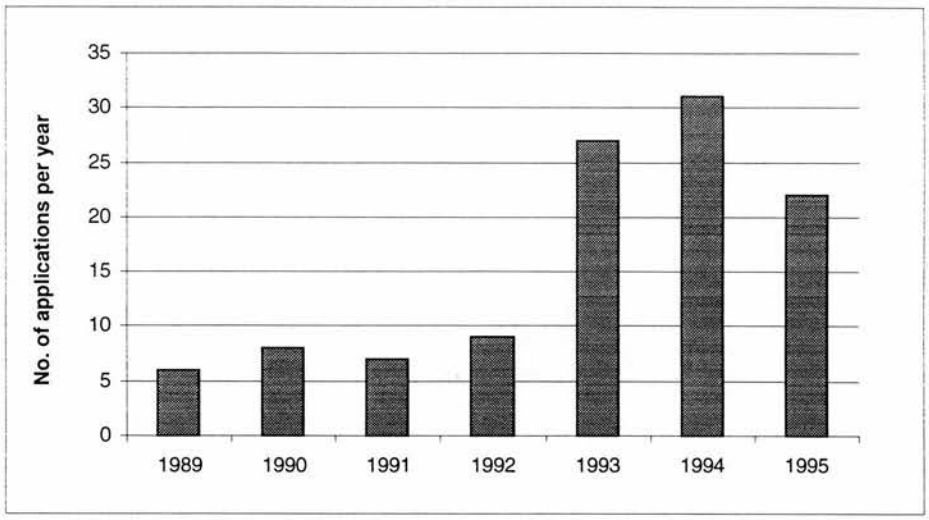
The second form of elite influence relates to the duties that staff are asked to perform. Again, the evidence for elite interference comes from the Dito Juan/Richard Belisle era. Following a recommendation of the FPMP, a member of the FD was permanently assigned to mangrove management duties (he was the author's counterpart over the first half of 1993, and received training in administering the permit process). In 1995, this individual was taken off mangrove duties by Belisle for four months. This period coincided with the dry season, the time of year when the majority of mangrove clearance work is carried out. Therefore, this was when the greatest number of permit applications would be expected and patrolling needed to be at their maximum.

The reason the Mangrove Manager was removed from his post was to serve the private interests of Belisle. Increasingly, over the 1990s, Belize hosted US undergraduate students on tropical resource study programmes. They pay in the region of £1,700-£3,500 and gain credits for their degrees in the US. Belisle's wife set up a business hosting these groups, and the Mangrove Manager had been assigned to help her look after them.

Over this four month period of his absence, no other staff had been assigned to cover mangrove responsibilities (nor were any individuals trained to do so). Here, an elite bureaucrat, through his association with the Minister of Natural Resources, was using government staff resources for his own private benefit. As a direct consequence, the effectiveness of the regulations was severely undermined. In terms of the mangrove regulations, the major manifestation of this was to reverse the trend in the number of applications received. Up to this point, as a consequence of the FPMP (1992/93) and the FD's increased policing and publicity, the increase represented the growing compliance with

the regulations. As the major legal mechanism for instigating sustainable patterns of mangrove exploitation, this trend was extremely important. However, the withdrawal of the Mangrove Manager caused a decrease in the applications for alteration permits (Figure 49). Instead of the estimated 37 applications expected in line with the 15% rate of growth from 1993-94, there were only an estimated 22 applications, roughly 40% lower than expected. With no appropriate FD staff in the office to respond to the in-coming enquiries, permit applications were not being processed.

Figure 49 Number of applications to alter mangrove received by the FD 1989-95



Source: Forest Department

Note: The figure for 1995 is an estimate based *pro rata* on the number of applications for January to July. Access to records was not available after this period.

The ruling elite and the misappropriation of FD equipment: Dito Juan also supplies an example of the diversion of FD equipment that has diminished the effectiveness of the regulations. As part of the FPMP's spending on equipment to support the FD, a motorised skiff was bought for mangrove management activities. It enabled field visits to assess applications for mangrove alteration out on the cayes and for general patrolling duties. With not a small degree of irony, the Minister requisitioned the skiff to support the government dredge, which was providing spoil to fill a mangrove sub-division on Ambergris Caye. Despite concern voiced to the Minister by the FPMP team leader and attempted intervention by senior ODA staff, the boat was retained for this use until the dredging was finished (Respondent 20).

The logging elite and under-financing of the FD: This section deals with FD funding and the impact of elite individuals on the level of finances it receives. Funding for the FD is annually negotiated by the CFO with the Minister of Natural Resources, and a bid submitted to the Treasury. In recent years, the recurrent expenditure allocations (BZ$1,996,377 in 1988/89) have shown a downward trend, while actual recurrent expenditures have been below these budgeted levels in compliance with treasury instructions (OFI 1989). The shortage of funds is most obviously explained as a result of the public sector spending ceiling imposed as a condition of IMF loans granted to Belize during the 1980s. In practice however, the more deep-rooted cause identified from this research arises out of local socio-political relations. Specifically, the few remaining individuals who run large logging operations are on sufficiently good terms with Ministers to prevent them raising harvesting royalties to market levels [10]. Certainly, at least one major logging operator is a PUP supporter and a long-standing friend of their Minister of Natural Resources, Florencio Marin (Respondents 6 and 7). This explanation was recounted by several people. Respondent 5, for example, cited it as the reason for the failure to implement any of the ODA-funded studies by forest economists that recommended raising logging royalties (e.g. the 800% increase recommendation referred to by Howell 1994).

The financial significance of this royalty issue for the FD is that they are the main source of revenue it generates. Whilst the money goes to the central treasury, it is used as the basis from which the FD negotiates its funding allocation. By suppressing this revenue, the logging interests are continuing to weaken the revenue base of the FD, indirectly reducing its capacity to fulfil its other duties, including mangrove management. Furthermore, illegal logging and milling of timber is having the same effect (Respondent 20). In this light therefore, the FD's lack of financial resources is actually due to a combination of external monetary pressures imposed by the IMF and by socio-political relations between politicians and powerful logging interests. Even if the ruling elite wanted to fund the FD's mangrove protection activities, it is not in their party or personal interests to achieve this by raising

[10] This tallies with historical accounts of much the same influence (e.g. Bolland 1988). A review of the long sequence of FD Annual Reports (1925-1975), reveals complaints of underfunding dating back to the 1930s, attesting to the long struggle FD has had to secure an appropriate budget. This has consistently been because the forestry elite have been able to avoid the levy, or at least collection, of realistic royalties on the timber they were harvesting (*Ibid*). The funding shortage that resulted became even worse after 1959, when the FD was cut back during national economic recession. At this time, a report into the country's economy (Downie 1959) recommended the Colonial authorities curtail forestry investment and divert the money to more immediate needs. The fact that forestry's contribution to the economy had declined so severely because of the under-payment of royalties no doubt encouraged Downie to take this view.

royalties and reducing the profits of the loggers on whose intra-elite support their party will need to call for election funds.

6.2.2 The Failures of the Regulations Unrelated to Elite Influence: The findings above show that there has been significant elite influence undermining the implementation of the mangrove regulations to promote more sustainable mangrove use. Scrutiny of the regulations' enforcement also shows that there are factors inhibiting their enforcement which are not related to elite interference. These are now considered to enable the relative importance of the two sets of influences to be compared.

Examination of FD files and interviews with the CFO showed poor management to be a significant contributing factor to the ineffectiveness of the mangrove regulations. Inconsistent administration of the permit system, absence of records of telephone conversations or meetings with applicants, abundant cases of missing and/or incomplete records, and lack of co-ordination between the FD offices, all inhibited their enforcement. These were clearly straightforward examples of maladministration. The widely recognised cause of such problems stems from the low salaries provided by government. This results in a disproportionate number of lower calibre staff in government posts (Respondent 2, 3, 20).

In addition to their skills, in a large number of cases, productivity fell far below the normal levels experienced in Belize's private sector, with pervasive problems of alcoholism and absenteeism (Respondents 8, 9 and 26). That this was allowed to pervade the Department is also the result of poor management by successive CFO's. Although appointed by the Minister, the choice of experienced and qualified individuals for this post is extremely limited. Even if sufficiently experienced in forestry, there is little or no chance of finding individuals with additional qualifications in management.

One further point regarding the financial component to poor management relates to the fact that the regulations provide for the levy of an administration fee. This is designed to cover the costs associated with processing the permit (£90 for clearance of more than 0.4ha). The amount of revenue generated has, however, never been monitored by the CFO and in several cases was not collected. The CFO therefore made no effort to argue for a mangrove management funding allocation from the Treasury to cover the new mangrove duties.

The lack of prosecutions under the Regulations may seem a likely context in which to find elite influence at work. The FD Mangrove Manager certainly considered this the case, when he complained that

> 'those judges, they're just scared of those big lawyers' (i.e. the lawyer/politician elite).

The implication was that by hiring 'the right lawyer', judges would be intimidated and let off the person being prosecuted. This however, is demonstrably not the case. The evidence is that other departments, notably Fisheries and Public Health, regularly prosecute people who have broken the environmental regulations under their domain. The six cases of illegal mangrove clearance taken court by the FD by 1995 were all dismissed on technicalities which resulted from the failure of the FD staff to correctly follow procedures for providing evidence. Again, the failure of the Regulations in this respect, relates to technical capacity and staff competence.

Finally, the other factor inhibiting the FD's implementation of the Regulations has been its technical capacity. The passage of the mangrove protection regulations in 1989 had added the protection of an extra 779 square kilometres of wetlands to its remit. In one step, it was given the responsibility to conserve the mangroves inland, along the coast, and over 1,000 cayes, with no mangroves expertise, no mangrove information and no boats. This was not an auspicious start to the new era of mangrove protection supposedly heralded in by the passage of the regulations.

Between 1989 and 1992, the FD tried to respond by seeking advice from agencies with more appropriately qualified staff [11]. Between 1989-1992, conditions attached to permits were taken directly from the recommendations of Fisheries staff. This overcame the problem, but delayed responses to applicants by relying on an external source. From comments made by several developers, such delays are the major factor that discourages them from making an application.

[11] It is recorded at a 1991 meeting of the CZMU Technical Committee for example (Meeting Minutes, 11th December 1991), that the CFO requested assistance from Fisheries in training his staff in assessment of mangrove areas.

6.2.3 Summary - Elite Sabotage of the FD? The OFI review found the FD 'too understaffed and under-financed to successfully undertake the wide range of essential tasks needed for the planning and management of a large forest estate for conservation, protection and production purposes' (OFI 1989 p. 104). Furthermore, it was characterised by 'inadequate management and low staff morale' (p. 140). The evaluation of the implementation of the mangrove regulations for this research has confirmed institutional weaknesses that have undermined the FD's effectiveness in implementing mangrove management. In accounting for the root of several of these key problems, there is evidence for elite influences at work. Therefore, although many of the other FD problems arise from poor management (that can be overcome by the 'institutional strengthening' and 'training' proposed by the FPMP), elite mangrove stakeholders are complicit in the more fundamental failure of the mangrove regulations to effectively control the mangrove exploitation.

6.3 Protected Areas - Mangrove Reserves or Paper Parks?

This section provides brief further evidence of elite interference in the effectiveness of a measure aimed at ensuring sustainable mangrove use.

Burdon Canal: As already highlighted in Chapter 5, the Burdon Canal Nature Reserve was created in 1992. Heralded as a 'conservation milestone' by local and international conservation NGOs, designation resulted from a combination of lobbying from the Fisheries Department, the BAS (e.g. BAS 1988b, 1989) and the desire by the Minister to make a 'green' gesture at the UN Conference on Environment and Development (Respondent 11).

From the point of view of the BAS and Fisheries Department, the nature reserve was designed to preserve a portion of mangrove in response to increasing clearance around the City. It also aimed to protect the area's wildlife and to serve an education and research role. Finally, it was to help ensure the banks of the Burdon Canal were protected from erosion, by keeping the. mangroves in place (David Meldrew, pers. comm. 1992).

Subsequently, after Marin declared the reserve, it became clear that he had been sanctioning the allocation of leases within it (LSD correspondence on file dated 18th May 1994 and 6th June 1994, and CFO pers. comm. 1993). These were given out by the LSD and only came to the FD's attention when occupants began to clear mangroves. The CFO and FPMP staff

raised this issue with Marin and senior LSD officials, pointing out that the leases were technically illegal. This made no difference since LSD files show that leases continued to be issued by this and the next administration (Respondent 31). As the Mangrove Manager noted in his biannual internal report to the CFO (March 1995) 'the LSD clearly have more pressing 'political' concerns than protecting the environment'. The allocation of land again was in response to the high level of demand and for patronage. This erosion of the integrity of Burdon Canal Nature Reserve therefore provides another example of elite influence in the attempted implementation of sustainable mangrove use.

Forest Reserves: The decision to retain or de-reserve Forest Reserves rests with the Minister for Natural Resources. Given demands for agricultural diversification in recent years, there has been pressure brought by agro-industrial interests for exclusions to be made for farming. As a result, both political parties have pursued the tacit and unofficial de-reservation, with the Minister simply leasing land to favoured supporters for agro-industrial projects (King *et al.* 1993, Smith 1991). Generally, this has also been done without the knowledge of the FD (Respondents 1 and 8). This unofficial 'de-reservation' process has lead to the decline in the integrity of all the Forest Reserves in which mangroves are found.. Although not yet affected by the agro-industrial activities taking place (citrus farming), these mangrove can no longer truly be considered 'protected'.

Clearly, given the evidence above, there is elite influence undermining the integrity of protected areas. Its cause is again related to the allocation of state land for patronage. Its impact is extremely significant because the designation of reserves has formed the cornerstone of environmentalists' attempts to implement sustainable management of coastal resources in Belize (see, for example, Price *et al.* 1990).

6.4 A Growing Picture of Elite Influence in Mangrove Exploitation

Evidence from this chapter, together with the preceding analysis, has revealed a broad constituency of elite stakeholders who have been influential in determining the patterns of mangrove exploitation taking place in Belize. It is also apparent that there are socio-political relationships, structures and motives allied to elites that predetermine certain types of exploitation. In particular, these result from the pursuit by all elite groups of personal financial benefits. Added to this, there is the pervasive influence of the ruling elite to maintain intra-elite and elite-non-elite support using patronage. To meet both requirements

to the greatest extent, exploitation of mangroves cannot countenance the restrictions that sustainable development entails. The forms of development pursued are therefore unsustainable.

These are the indications that have emerged from the evidence assembled to this point. The next chapter takes a more site-specific examination of the stakeholder interactions associated with mangrove exploitation. These will be scrutinised for evidence that either supports or refutes these emerging propositions. It is these case studies to which the thesis now turns.

Case Studies of the Influence of Different Elites on Mangrove Exploitation

7

The preceding chapter examined the role of elite stakeholders in mangrove exploitation. It also identified ways in which their influence affected the enforcement of the mangrove regulations. In this chapter, evidence is evaluated for the role of elite individuals in particular mangrove developments. The aim is to deepen the understanding of the different types of motives, resources and relationships that the main elite groups have at their disposal, in the different types of development they pursue.

A combination of detailed case studies and shorter evaluations are used. They cover the principal types of elite involvement in mangrove exploitation that have been identified. The result is a sequence of investigations, ordered approximately according to the extent of mangrove affected. The individual analyses are the final evidence used to assess the role of elites in influencing the sustainability of mangrove exploitation.

The evidence used for this assessment is drawn primarily from qualitative sources. As the circulation of rumours and speculation in the media often signaled activities of interest to this thesis, these were frequently investigated. Both are an influential part of political and commercial interaction in Belize, and provide a range of useful insights. Where information was gathered from such sources, it was verified or refuted by cross-checking with respondents or documentary sources such as land ownership records.

Issues of balance also come into play in the selection of information. Clearly, whilst working for the FD, conservationists were more likely to divulge confidences. This had to be countered since leaving the FD by interacting with contacts as a neutral observer, interested in general coastal development issues.

In overcoming people's reticence to divulge sensitive information, being from overseas helped because people evidently felt there would be no 'come back' from imparting information. Otherwise, in a small community such as Belize, people are genuinely

concerned that their jobs and other activities can be prejudiced by speaking out against political leaders (Respondent 13).

There have also been particular instances during the research when questions of ethics come into play, most frequently when information has been visible without the owner's knowledge or consent. Clearly this cannot be used, even though it may confirm personal interpretations of events or relations. Being present in people's offices when phone calls are taken or visitors appear has been the most common example of this.

Overall, with these issues in mind, and by seeking views from a balanced range of informed sources, the pattern of elite activities has been woven together using information of varying character and origin.

7.1 Mangrove Developments and the Selection of Case Studies

As already identified, the period 1988-93 saw an unprecedented escalation of mangrove conversion, principally for housing and tourism. This chapter scrutinises the involvement of elite individuals from a representative range of the projects from this period. The objective in all cases is to elicit the detailed workings of the different types of elites, in relation to the main types of mangrove development identified in the preceding chapters.

In order to select the case studies, the following criteria were used. The sites needed to be:-

i. representative of one of the main causes of mangrove clearance,
ii. representative of one of the main types of elite stakeholder involvement,
iii. have sufficient data to enable a rigorous analysis of elite influence to be carried out.

The resulting case studies are now examined, beginning with the way in which elite influence was exerted on the development of mangroves in Belize City. This covers the role of the ruling elite and the most powerful elite developer in Belize, Javier 'Berbey' Garcia. This will be covered in greatest depth, since it accounted for the great majority of mangrove clearance over the study period. The second tier of elite developers is then examined, using the case of Arnaldo Peña at Punta del Este. These two studies cover the clearance of

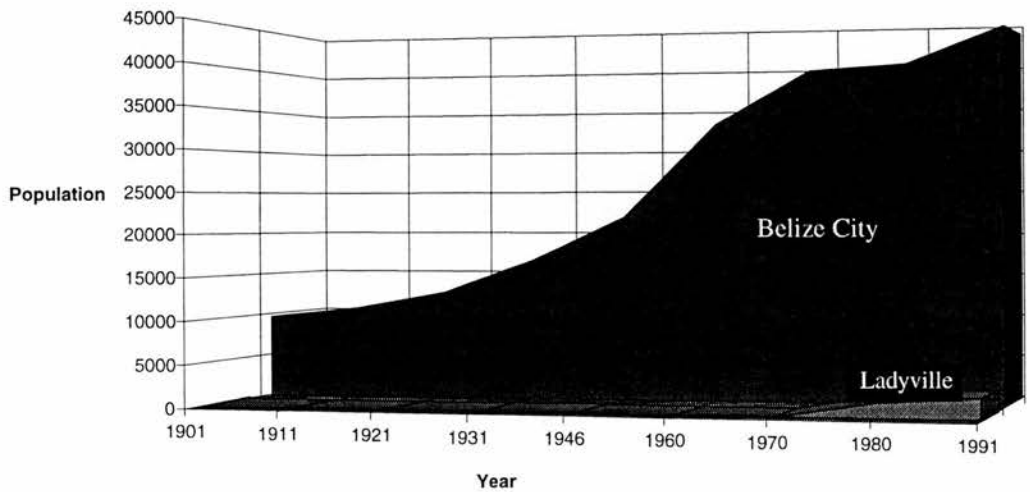
mangroves for housing. To elaborate on tourism impacts, the role of Glen Godfrey is examined for Caye Caulker and of developers on Turneffe. The chapter then concludes with a summary of the additional findings on elite influence on mangrove exploitation.

7.2 Belize City - Stakeholders, Choices and the Political Ecology of Housing Provision

7.2.1 Why Was Land Needed? Up to the mid-1980s, housing demand had, to a large extent, been capped by peoples' poverty. As a side-effect of the economic up-turn however, latent demand began to emerge as an increasing public demand for housing. In addition, the City had a high proportion of young residents entering their period of household formation and its population was growing (Figure 50). Finally, widespread poverty meant that there was over-crowding in several areas. Data from the mid-1980s shows that 43% of households were sharing accommodation with at least one other household and population densities were as high as 340 people per ha in older parts of the city (especially remarkable as no buildings are over two stories high) (Farazli 1987, Tasker-Brown 1988).

At the root of this situation was the difficulty and expense of individually 'reclaiming' mangroves on which to build, because they had to be drained and filled. Raising the land to at least 0.6m above sea level, costs £1,900-2,200 per average 15m by 21m lot. This has been a considerable obstacle for development, given the income of most City residents and helps to account for the high degree of over-crowding that existed by the mid-1980s. Whilst people's incomes increased, they still wanted the government to fill the land, on which they could then afford to build a home (in stages, if necessary).

Figure 50 Population growth for Ladyville and Belize City (1901-1991)



Source: GOB census data

Meeting this demand largely dictated the political agenda for Belize City in the late 1980s. As Florencio Marin, the Minister of Natural Resources, recalled in 1991, 'each week as I meet the public, the single most common request that is raised is that for land to construct residences and for other purposes in the Belize City area' (Belize Times July 14th, 1991:16). The Department of Housing and Planning (DHP) estimated that 597ha was needed for housing by 2010, equivalent to 250-400 lots per year (UDC 1988).

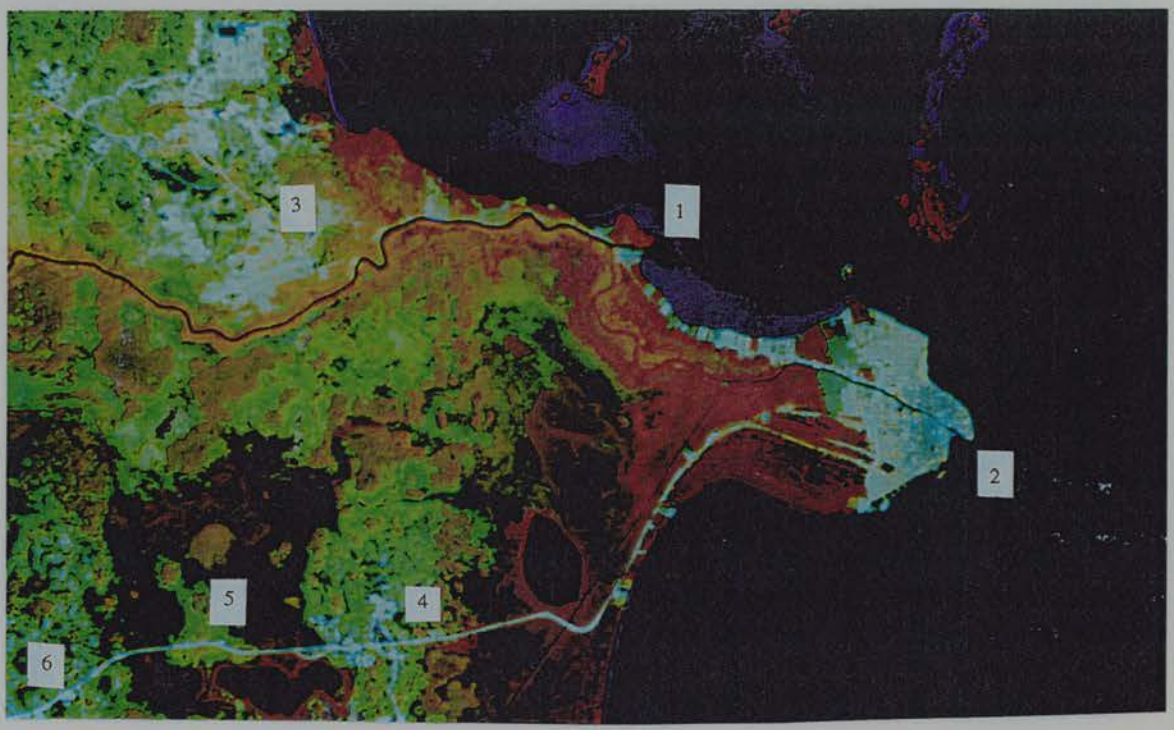
7.2.2 The 'Promised Land': As a result of these pressures, and the timing of the economic up-turn, land provision became a key political theme for the 1989 election. Given that 10 out of the country's 28 parliamentary constituencies are based in Belize City, it is also no surprise that the need for a response was felt by many members of the political elite. In accordance with the patronage politics of Belize, house lots or cheap housing were anticipated by constituents in return for voting. Area representatives literally had people queuing outside their offices to try and secure leases. In its campaign the PUP promised, through public/private partnerships, to provide 5,000 building plots immediately after being elected. When the PUP subsequently won, they were faced with the prospect of fulfilling their promise, as the pay back for political support. The first case study examines the role of ruling elites and their developer elite supporters in the choice of strategy to accommodate this demand, in the light of the alternative approaches being recommended by environmentalists and planners.

Firstly however, it is useful to examine the problems facing the PUP at this time, in terms of over-coming the environmental constraints of the City's mangrove setting. It is also necessary to elaborate on the options for City expansion and the impact of the calls for mangrove protection from environmentalists and planners. It will be argued that the development option they put forward entailed excessive political and economic opportunity costs for the ruling elite. Both were unsuccessful in having their strategies adopted because they had no leverage and did not address their concerns to the elite individuals who were actually making the development decisions.

7.2.3 The Environment Context for Growth: The original reason for building a settlement at the mouth of the Haulover Creek was that the river provided the only means of transporting logs from the interior. Its labyrinthine mangrove-lined creeks also provided a

well-hidden retreat from the Spanish, the main enemy at the time. Four hundred years later, neither justification applies but nonetheless the City remains in its low-lying deltaic setting. The main environmental attributes of this area are illustrated in Figure 51. Having originally been established at the mouth of the Haulover, the settlement grew westwards, encroaching into riverine and basin mangrove forests. In the early 1980s, ribbon development along the Northern Highway opened up the area known as Caribbean Shores, with isolated developments in the same period following the Western Highway. By the late 1980s, with the rapid increase in housing demand, options for further development needed to be made.

Figure 51 The environmental context of Belize City's growth



Source: Landsat TM image 4th January 1987, Path 19, Row 47.

The delta's natural vegetation is mostly mangroves (red and dark orange), but also includes occasional isolated belts of riparian forest along river levees and herbaceous marsh in freshwater and brackish depressions (light orange). The contemporary form of the delta itself is relatively recent, created before the Belize River established its present outfall, cutting through the strip of land that had separated it from the sea (1). The old channel, now much diminished, continues five miles further, bisecting the delta, and occupied by the river known as Haulover Creek (2). With the small tidal range typical of the Caribbean, the delta is low with an extremely shallow gradient. Groundwater is at or near the surface. The nearest higher land is found to the north-west, immediately along the banks of the Belize River, and provides the site for Ladyville (3). To the west, the emergence of higher land is patchy, encountered first at Mile 8 (4) and then Almond Hill, a dry 'island' that rises from the mangrove-filled depression (5). Further inland, as the height of the coastal plain increases, mangroves are absent, although a mosaic of wet and dry savanna (green) persists for many kilometres towards Hattieville (6).

Four main environmental characteristics of the City's location are significant influences in determining its development. Firstly, the low elevation of the area means land has to be drained and filled in order to be inhabitable. This required the raising of ground level by approximately 0.6m, entailing substantial quantities of fill to be obtained. As already highlighted, this entails a considerable cost, either dredging and dumping marine sediments, creating cut-and-fill canals on-site (with accompanying loss of building area) or importing material from spoil pits further inland. The low elevation also requires a further precaution against flooding during the rainy season, specifically the raising of floor and entrance levels of buildings by a further 0.2-0.5m. Again, this adds to the expense of construction. Clearly, over-coming the area's low elevation carries a major economic cost for City development.

The second environmental characteristic of significance is that the low bearing capacity of the substrate requires specific adjustments in building design. Underlain by unconsolidated peat and organic marine silts, modern concrete buildings are liable to subsidence, being larger and heavier than earlier building types. Furthermore, with increasing house size and the growing need for industrial and commercial structures, this problem has become more acute. It can be overcome by building on piles driven through the underlying peat down to bedrock, 20-35m below. Again though, this incurs significant costs. Numerous examples exist around the City where developers have failed to use appropriate building methods, resulting in tilting abandoned buildings (Plate 19)

Plate 19 **Example of a modern building subsiding due to the instability of underlying mangrove peat and the lack of suitable piling**

The third significant environmental characteristic of the area results from Belize's position in the hurricane belt. Major hurricanes struck the City in 1931 and 1961, causing hundreds of deaths and extensive physical damage. Situated on the coast, the City is not only vulnerable to the high winds associated with hurricanes, but also the storm surges that they cause. In 1931 and 1961, these reached over 3m and were responsible for the majority of deaths and structural damage. Given this threat, buildings are often put on stilts to mitigate against the flood risk (Plate 20) and have special roof designs to resist wind damage. Where people choose not to take these precautions, house insurance is more expensive. Either way, an extra economic cost is incurred because of the hurricane risk.

Plate 20 **Examples of houses built on stilts to protect property from flooding. The photo also illustrates the drainage and fill needed to build in this former mangrove area**

Finally, the other important environmental characteristic is the location of the nearest higher land, where expenditure to overcome the disadvantages of the mangrove setting is not required. The closest areas are 12.5km northwest, at Ladyville and towards Hattieville (see Figure 51). These 'satellite' settlements have sufficient land to accommodate the City's housing needs and are approximately only a 20 minute bus ride from the City centre.

These four features represent the constraints imposed on the City's expansion by its environment. In the face of these, options were developed by conservation, technocratic and elite stakeholders, each to meet their own specific development goals. The basic tenets of their development options are now examined, before identifying the way in which the ruling elite imposed its solution for accommodating growth.

7.2.4 The Environmentalist's 'Sustainable Development' Option: Guidelines for the sustainable development of Belize City emerged in the early 1990s in response to growing concern about escalating mangrove clearance. Formulated by the Coastal Zone Management Unit (CZMU), through the work of its coordinator, David Meldrew, these recommendations were passed to the Minister of Natural Resources, Florencio Marin and the Minister of Agriculture and Fisheries, Mike Espat, plus the Commissioner of Land and Surveys (Meldrew pers. comm. 1992). In the form of maps showing 'mangrove protection zones' and recommendations about buffers (to be retained around the sewage ponds, along the sea front, Haulover Creek and Belize River), these formed the first part of the strategy for a sustainable form of City growth. In turn, these were based on the recommendations of an American mangrove ecologist, Robert Yew, who visited Belize in 1992, sponsored by the Florida Council for Voluntary Organisations. These measures were to be incorporated into existing and on-going developments already underway. The second part of the sustainable strategy was to accommodate the majority of housing on higher land, in Ladyville and Hattieville, an option known as 'satellite settlement' (Meldrew pers. comm. 1992). Supporting this option were the FD, Fisheries Department (of which the CZMU was part) and the BAS, together forming the conservation nexus.

In lobbying for the sustainable strategy's adoption, they based their case on three arguments. The first was that the mangroves were of intrinsic value in themselves. Time-series land cover mapping by McShane (1991) [1], suggested that all mangroves on the peninsula would be obliterated by 2006. This was not an acceptable outcome from the conservation perspective, because it eliminated all the ecological and physical benefits that the area's mangroves had been providing. Foremost amongst these, Meldrew emphasised their importance as 'critical habitat' for wildlife and fisheries (Meldrew, pers. comm. 1992). To protect these and other benefits, he and Yew have formulated a series of zoning recommendations. The retention of mangroves along the Haulover Creek and sea front was to minimise erosion and allow for their continued detrital and physical contributions to

[1] Later refined by Murray (1995)

to minimise erosion and allow for their continued detrital and physical contributions to fisheries productivity. The strict protection of the remaining riverine mangroves at the mouth of the Belize River was called for in particular, as basic principles of mangrove ecology implied that these were of particular importance for their contribution to fisheries productivity. Protection of mangroves around various mangrove-lined lagoons and around the Haulover Creek and Burdon Canal was proposed for wildlife protection and eco-tourism. This latter activity was heavily promoted because it allowed the simultaneous fulfilment of conservation and commercial objectives, encapsulated by sustainable development ideology. Furthermore, there were tour operators willing to lobby in support of protecting the waterways used for nature tours (e.g. Mike Huesner of the Belize River Lodge) (Huesner, pers. comm. 1992). Finally, zoning was proposed to retain the mangroves around the sewage ponds, allowing for their biofiltration role to improve the quality of the discharged effluent.

The second tenet of the conservationist's stance was that further expansion of the City should not be encouraged because its location made it vulnerable to hurricane impacts. Meldrew therefore recommended that growth should be accommodated by the expansion of Hattieville and Ladyville. As well as enhancing the safety and long-term sustainability of new housing, it also meant that the mangroves in the area would not be sacrificed. The savanna around Hattieville and Ladyville was neither as rare nor as well endowed with ecological and physical benefits as the mangrove, so their loss was considered a justifiable sacrifice (Meldrew, pers. comm. 1992).

The third set of arguments marshalled by the conservation lobby was economic. They sought to highlight the additional costs of City development in a mangrove environment. Using this to appeal to the politician's economic logic, they sought to legitimise their sustainable strategy as an economically rational one.

These three components formed the environmentalists' case for directing the City's expansion. The key figure in its formulation and promotion was David Meldrew. By his own admission, Meldrew felt uncomfortable personally lobbying members of the ruling elite. He therefore formulated these recommendations as policy papers with accompanying maps, which were passed through his line manager, the Chief Fisheries Administrator, for dispatch by post to Marin and Espat. In this way, the environmentalists formulated and delivered their strategy for sustainable development of Belize City.

7.2.5 The Planners' 'Rational' Option for Growth: The second group who were formulating guidelines for meeting the demand for land were the City's planners. Their activity is considered because the technocratic recommendations provided could potentially, have incorporated elements put forward by the environmental lobby. The planners' objectives are different, in that they seek to guide development in order to minimise land use conflicts and ensure adequate provision of land for development purposes (UDC 1988). Nonetheless, whilst not conservation orientated, this process is based on the notion of 'rationality' in land use allocation. This ideology, the culture of the individuals and institutions associated with it, are in tune with the positivist epistemology from which environmental recommendations emerge through ecological analysis.

The significance of this group in relation to elite influence becomes clear from comments made by the elite developer, Berbey Garcia, as shown below. They were marginalised in the decision making process, reflecting the low status of technocrats recounted in Chapter 2.

In 1988, the Department of Housing and Planning (DHP) had set about the preparation of a development strategy for the City, with assistance from the ODA and CIDA (in the form of the sponsoring of a VSO Urban Planner, and a team of university planning specialists respectively). The result was the draft Comprehensive Development Plan for Belize City (1990), the first rigorous attempt to instigate City planning. The preparation of this report represented the most ambitious and detailed effort to date, to collect and analyse relevant data and to create a framework for future growth and development of the City. The Plan, based on a series of technical studies and reports (on population, housing, employment, industry, commercial and office, tourism, utilities, the environment and land development produced primarily by the School of Urban Planning, McGill University over 1987-1988) took a classical land use planning approach, based on the UK prototype, transplanted to Belize via its Town Planning Act (1945). The DHP's staff worked for two years developing the plan, in preparation for its submission to government, for approval and legal adoption. It recommended a phased process of mangrove in-filling, retention of mangrove buffers, with a longer term move towards satellite growth beyond the year 2010. However, despite its technical quality, it was never adopted by Cabinet and therefore is not in force. The reason for this is related to the impediments it put in the way of the ruling elite meeting their objectives. These are the individuals considered next.

7.2.6 The PUP Elite and Their Option for Growth: The key figures who ultimately took the decision on the development option to be pursued were Florencio Marin, Minister for Natural Resources and Berbey Garcia, the PUP's favoured land developer. As central members of the PUP elite, their objectives were to secure private, party and public benefits. Their requirement was jointly to create the maximum number of house lots to allocate to supporters. To pay for the developments, a proportion had to be sold, and this would also generate the opportunity for government revenue and private commercial profits. At a superficial level, the way this might have been achieved could be anticipated to broadly have followed the recommendation of the planners, who had comprehensively reviewed housing needs and allocated the mangroves most suitable for conversion. In addition, there might possibly be some element of environmental protection incorporated in response to the conservationists' concern. The outcome that did in fact result, is identified below in Section 7.3. Before proceeding to this, however, a summary of all the potential options, the main stakeholders and their different recommendations for growth is given in Table 12.

Table 15 Summary of stakeholders and their recommended approaches to housing development in Belize City

Stakeholder Group	Recommendation	Motivation
Conservation nexus (CZMU/Fisheries Department, FD and BAS)	Minimising mangrove clearance by diversion of city growth to non-mangrove areas. Incorporating protective zoning in existing built up areas of the City.	Sustainable development and mangrove conservation
City planners (Department of Housing and Planning)	Rational zoned development to provide for various urban land needs.	Facilitate development and minimise conflict between incompatible land uses.
Ruling elite (Minister of Natural Resources, the City's PUP area representatives and senators)	Providing lots to allocate to PUP supporters. Promote the intensive development of mangroves in all constituencies.	Kudos for the PUP, winning votes and staying in power.
Javier 'Berbey' Garcia, PUP activist and elite developer	Large-scale clearance of mangrove	Profit from land development. Providing land for City residents.
City residents	Wanting politicians to provide house lots	Poorly-housed expanding population in need of new or improved homes

7.3 The PUP 'Stitch-Up' - Mangrove Loss and Elite Gain

The sections above have identified the need, constraints and options for mangrove exploitation in Belize City. In this section, the way in which the actual development outcome was determined by elite individuals is assessed. This seeks to further the argument

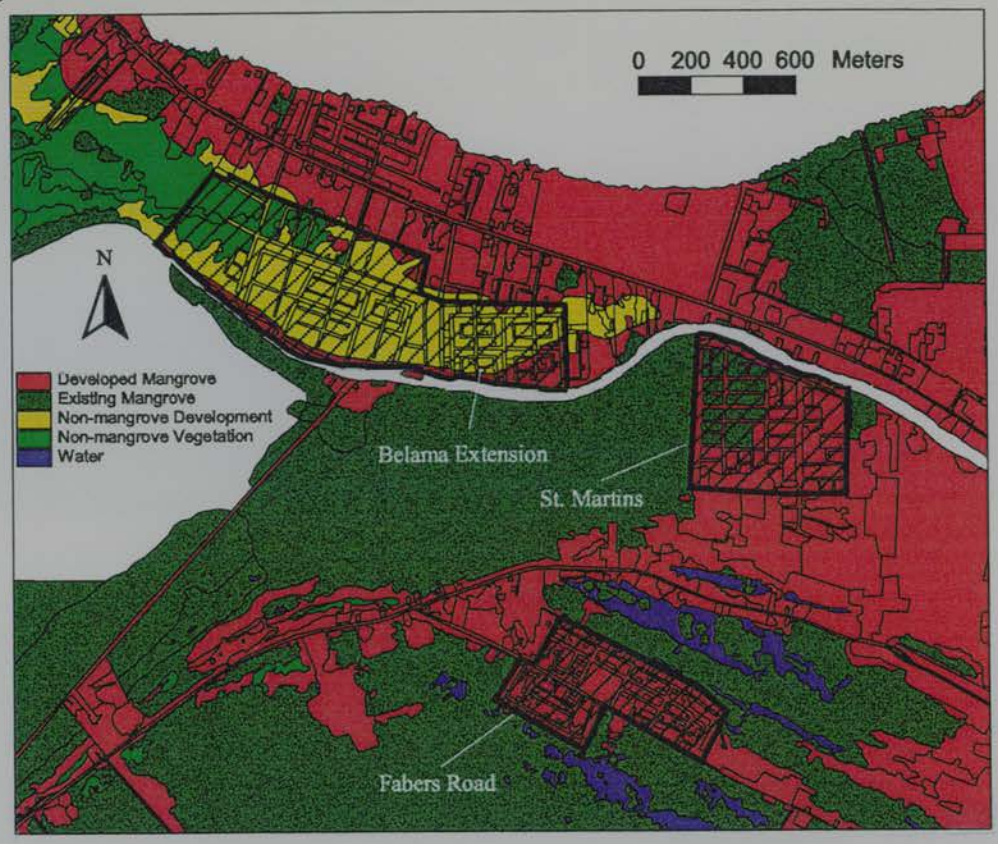
that sustainable forms of mangrove exploitation are not in the interests of elites, by providing evidence of, and accounting for their unsustainable development preferences.

7.3.1 The PUP Choice of Development Option: From conversations with Garcia, Peña and a number of respondents, it became clear over the research period that the decision about the City's expansion had been taken several months before the election was won (Respondents 1, 6, 10 and 26). Central to this was the Minister of Natural Resources, Florencio Marin. He had asked Berbey Garcia, as the PUP's key developer, to undertake a series of land clearance projects that would provide several hundred lots. As a precaution, he also asked Peña, the PUP's second but less experienced elite developer, to convert another mangrove area into housing. In total, through these individuals, the new government planned to make available 3,700 public lots (Belize Today, June 1991, 13-14). In addition, Garcia and Peña were to provide approximately 1,000 commercial lots as part of joint public/private developments. The location of these projects is shown in Figure 38. More detailed illustration of the main sites in Figure 52 and Plates 21-23.

These developments, under the PUP's 'Land Reclamation Programme' were described by Respondent 11 as a 'complete stitch up!' by the PUP elite. The particular characteristics of the decision-making process to which she referred were the lack of public consultation, absence of liaison with the City's planners and lack of input from the other regulatory authorities, including those promoting sustainable mangrove protection. The environmental and planning options had been ignored, and the decision taken independently by two key figures, Florencio Marin and Berbey Garcia, with inputs also from Ralph Fonseca (Minister of State in the Ministry of Finance) and the Prime Minister George Price (also Minister of Finance). By widespread use of the media, the PUP sought to legitimise their *fait accompli* under the banner of efficient public/private sector co-operation.

Political motives - maximising lots to allocate through patronage: The PUP agenda in this choice of development pattern was to maximise the number of lots to use in patronage, through the process already examined in Chapter 6. The environmentalists' strategy, with its land given over to buffers, was therefore anathema to these political interests. Even a 20m buffer along the Haulover Creek frontage of the Belama development would have sacrificed 70 house lots, representing the political support from this many families (LSD records).

Figure 52 **Location and mangrove impact of the PUP's main housing projects**



Source: Interpreted from 1993 colour air photo enlargements (approx. scale 1:8,000), transferred on to ArcView GIS

Plate 21 **View looking south over the Fabers Road housing project**

Plate 22 View looking over the Belama housing project

Plate 23 View looking upstream along the Haulover Creek with riverine mangrove to the right cleared for the Belama housing project

Equally important to the PUP elite was that 'satellite' growth did not provide equal patronage opportunities. Their development option provided lots in four different constituencies. *Collet* and *Lake Independence* accommodated the Fabers Road and St. Martins developments respectively, and were both held by the PUP. The Belama project was in *Caribbean Shores*, the constituency of the UDP's leader Manuel Esquivel. Development here provided the opportunity to increase the PUP vote by ensuring that as many lots as possible were allocated to their supporters, through the lots committee (Respondent 10 and 13). The development at Vista del Mar was in the PUP-held constituency of *Belize Rural South*, but as already highlighted in the previous chapter, it allowed the boosting of PUP support in advance of the new *Belize Rural Central* constituency being created for Ralph Fonseca. By comparison, the dispersal of new lots to Ladyville and Hattieville would have diluted the scope for gerrymandering in the City, whilst limiting voting impact to the Belize Rural South constituency. By comparison, this only benefited one constituency out of four.

These were the justifications why the ruling elite could not follow the environmentalists' prognosis for sustainable City development. The fact that the PUP elite also ignored the planners' development proposals needs to be accounted for next.

This could have been explained by the fact that the planning initiative was begun under the UDP administration, and, as is standard practice in Belize, projects instigated by one party are dropped when the other takes over government. The fact that the plan has also been ignored by the new UDP administration however, eliminates this as the most plausible cause. What is likely, in the light of the fact that statutory land use plans in Belize are rarely adopted, and almost universally never enforced, is that the ruling elite resist being confined in their manipulation of development and awarding of patronage, by having to conform to land use restraints. This is especially the case, when these plans are independently formulated by technocrats, in a process in which the ruling elite have no involvement. This accounts for the marginalisation of the planners in the decision over the City's development [2]. This particular explanation, interestingly, precisely matches the findings of Horowitz and Painter (1986:48) in relation to planning in Amazonia, quoted in Chapter 2.

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[2] At a 1994 consultation meeting to up-date the Plan, Housing and Planning Department staff were dismayed to discover that the Permanent Secretary of the Ministry of Natural Resources (which is responsible for land allocation and planning), was not even aware of its existence.

Further evidence of this resistance to planning is Garcia's instrumental role in getting the conservation-orientated Ambergris Caye Planning Authority replaced by pro-development business people such as PUP supporter Alan Freeman (Respondent 31).

These are the characteristics that motivated the ruling elite in their choice of development strategy for Belize City. To further scrutinise the influence of elites in mangrove exploitation, the role of Garcia, the elite developer, is now examined. Individually, he actually implemented the housing projects and is responsible for more mangrove clearance than any other person in Belize (approximately 15% of all the cleared mangrove up to 1992). His involvement is now considered in two different ways. The first (Section 7.3.2) is a brief examination of his personal background, elite status and view of mangrove development. The second (Section 7.3.3) is a more detailed assessment of his main project to date which affected mangrove exploitation, the Vista del Mar development.

7.3.2 'The Main Man of Mangrove Destruction' [3] - Berbey Garcia, Belize's Foremost Elite Developer: With every one of his projects in mangrove, this Panamanian developer is a key figure to scrutinise. He also enjoys a higher status than any other elite developer, occupying the top tier of this group. His arrival in Belize is a particularly idiosyncratic example of the type of Central American politics recounted by Graham Greene in 'Getting to Know the General' (1984). In the early 1970s, Belize was the only American country supporting Panama's bid to gain control of the Canal Zone from the USA. During one of his visits in connection with this alliance, George Price, Belize's PUP Prime Minister met Garcia, a friend of the Panamanian president. Garcia, from a politically well-connected family (his cousin was the Minister of Trade and Industry), already worked as a land developer in Panama. He and Price became good friends, and with the encouragement of the Panamanian President, Price invited Garcia to Belize to help with its development.

On arrival in 1976, he found the need for land development, but no one willing to take it on. Price asked him to build houses, but Berbey's response was

'I will develop the land. Let others build'.

This is the approach he took, and has taken consistently. By 1980, he implemented Bella Vista, his first significant project, a private housing sub-division in Belize City, and formed a company of the same name to pursue other developments. Second was Buttonwood Bay, also in the City, and his third, a sub-division for holiday homes was on Long Caye. All were entirely in mangroves. He was also contracted by the government to undertake public

[3] Quote from Respondent 21.

developments, the first of these being marine dredging to fill the Port Loyola area of Belize City, and later at West Landivar. Both involved the filling of former mangrove areas.

Garcia's growing elite status: Having proven his development capabilities with these projects, he became increasingly integrated into the PUP hierarchy and settled in Belize. By the late 1980s, Garcia had become established as a major PUP supporter, and as a party official (Chairman of its Finance Committee). All this increased his leverage to work with Price, other Ministers and senior bureaucrats as necessary. In addition, a kin relationship was established when he married the sister of Florencio Marin, the PUP Minister of Natural Resources, Deputy Prime Minister and the person responsible for land allocation and mangrove protection (1989-1993). He also became good friends with Ralph Fonseca, Minister of State in the Ministry of Finance (1989-1993) (Garcia, pers. comm. 1997).

As well as these strong family and party affiliations, Garcia also took a direct role in the machinery of development planning, as one of the two political appointees on the Land Utilisation Authority (from October 1989 until June 1993, i.e. during the PUP administration). This gave him full knowledge of developments going on around the country, securing a commercial advantage not enjoyed by other developers and a role in the conditions and/or permission granted to each application for sub-division. Of this role, he said,

> '(as a part of the PUP establishment) people said I would bring other (i.e. UDP) people down, because that is the way here. But I tried to encourage better development, make it more professional. Before the LUA had been very negative. People's developments were just rejected, with no reason. We changed to guidelines, and told people 'if you do this, this, this, we'll give you approval'. That's how it was'. (Garcia, pers. comm. 1997).

This appraisal of his own role is particularly interesting given the way the Vista del Mar project passed through the LUA, as shall be seen in the next section.

Garcia and the escalation of mangrove clearance: Drawing on huge reserves of energy, charm, drive and management ability, and unparalleled access to government support, Garcia became the key facilitator of the PUP's Land Reclamation Project. He took charge of this unprecedented era of mangrove clearance and was contracted by the PUP government to clear and fill the Belama [3], Faber's Road and St. Martins developments.

> 'Just a week after we were in power, I started with Belama'
>
> (Garcia, pers. comm. 1997).

In the lead up to this point, Garcia had been bringing into alignment his particularistic business needs and the PUP's need to get house lots for patronage. First of all, he monopolised the supply of fill for these projects by acquiring the clay pits and quarries from which Belize City is supplied (specifically Gracy Rock on the Western Highway and Lords Bank behind Ladyville) (Respondent 11 and 12). By doing this, he ensured that income would be generated in the early stages of the projects, from clearing the mangrove and filling it. As the shortage of finance was always a hindrance to development in Belize (Respondent 25, Garcia, pers. comm. 1997), this was an important contribution to sustaining the project's viability and progress. Once the land was prepared, his company would then also benefit financially from selling off house lots. In this way, Garcia would ensure financial benefits for himself. Secondly, in regard to the PUP's needs, he had been marshalling the PUP's campaign funds during the run up to the election.

> 'Helping the party to win. Putting all the money together. Getting
>
> my friends to get money together' (Garcia, pers. comm. 1997).

For this, the PUP hierarchy returned favours, typified by the type of support extended to his development at Vista del Mar (highlighted below). Thirdly, in relation to the universalistic benefits, Garcia had a genuine desire to

> 'help the people get decent homes out of the bloody swamp'
>
> (Garcia, pers. comm. 1997).

These were his main motivations. Their significance for the PUP's choice of City development strategy is considered below, but first Garcia's other relevant attitudes and beliefs need to be considered, specifically, in relation to planners and the environmental lobby.

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[3] So called because it signified Garcia's joint links with Belize and Panama.

A disdain for technocrats and bureaucrats: During discussions, Garcia made several points which explain why he avoided the planners' involvement in designing the City's development strategy. Firstly, he considered they caused too much delay. 'Can't wait for no civil servants' was his reasoning. This concern about delays matched comments made regularly by other developers. His inference was that these technocrats interfered with the development process, 'holding it up' instead of helping it forward.

Secondly, Garcia inferred that their involvement did not produce any significant benefit. These planners were 'not properly qualified' because they had no experience of 'doing development in the real world'. The implication was that he was better able to plan the City's growth than they were, so why should he wait for their recommendations?

Ultimately, the combination of these views resulted in Garcia taking the decision about the growth strategy to be adopted. 'When I planned the City' was not an idle boast of his, but an accurate reflection of how the PUP decision was made to accommodate the City's growth entirely in mangroves (Respondent 3). This fact was reflected by observations made of activities in Bella Vista Ltd.'s office. Plans of the major government sub-divisions underway were here that were neither at the Housing and Planning Department nor the LSD. This small private office, under the energetic guidance of this elite developer, was the place where decisions were made and carried through. Garcia's impatience with, and lack of confidence in technocrats explains why an entire planning department was marginalised, despite having compiled more fully considered land use plans for the City than had ever been available before. The planners' strategy for 'rational' City development simply was not held in sufficient esteem to be considered.

Garcia's dislike of environmentalists: Garcia also made it very clear that he neither trusted the environmentalists lobbying for mangrove protection, nor agreed with their view on vulnerability of the environment. In relation to the first concern, he complained

> 'You hear a lot of environmental talk, by people who know nothing.
>
> I don't deal with those f....ers.' (Garcia, pers. comm. 1997).

There was also a strong belief that a number of these conservationists were inspired by foreign interests. He complained

'They are getting salaries from the US. They are parasites

who get paid to do nothing'.

By nothing, he means perceives that they 'make no useful contribution to society', a role he clearly was antagonised by, seeing it as anti-development and unpatriotic. Displaying the strong nationalism that is a common trait of immigrants, Garcia saw these interests as being against Belize's development.

His dislike of environmentalists was not universal however, and he expressed his respect for

'people like Fabro [5], who have studied, and who know.'

It seems overall that Garcia's view of environmentalists is contingent on the individual, but that respect and trust are extremely important in his judgement. This reflects the typical characteristics of elite Latin American businessmen recounted in Chapter 2. That he had no respect for those promoting mangrove conservation was abundantly clear, from his repeated use of derogatory language to describe them.

In addition to the inter-personal opinions, his receptiveness to the arguments for mangrove conservation were also evidently coloured by his own understanding of ecology. This, he explained, was built up from his own experience, what he sees around him, and from

'what I see on TV. Especially the Discovery Channel'.

On this basis, he makes his personal evaluation of the arguments used by the conservationists to promote their strategy for sustainable City growth. Again, from the comments he made, he clearly refutes the basis on which these are founded. For example, having seen the fish in the canals dredged to provide extra fill, he concludes

'Despite what the environmentalists say, there are more

fishes now than ever before.'

On this basis, he dismissed the suggestion that mangrove clearance leads to a reduction in fisheries abundance.

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[5] Belize's Chief Environment Officer at the Department of Environment, Ministry of Tourism and Environment.

Garcia also still evidently held the belief that mangroves were 'worthless swamp', until turned into something useful by human endeavour. He saw this as a challenge, and liked Belize because 'it was all there to be done'. This makes an interesting contrast to the attraction of Belize quoted from the conservationist Archie Carr in Chapter 4. From his ideological perspective, Belize was attractive because it was 'near pristine'.

Finally, Garcia explained that he did not believe the environment was as sensitive as environmentalists were making out. Summing up this view, he said

> 'Mother Earth! That bitch been around four billion years.
>
> We shouldn't panic that much for her'.

Overall, in his attitude to the individuals promoting mangrove conservation and in his personal environmental beliefs, there are several reasons why Garcia was not prepared to adopt the environmentalist's strategy for accommodating the City's growth. Not only could he benefit financially more by building in mangroves, because they needed filling (i.e. with material from his quarries), he was also doing the nation a service, by converting these 'useless swamps' into good land for housing.

These are the individual views and motivation that shaped Garcia's behaviour in relation to mangroves in general, and their conversion in response to Belize City's housing needs. Having established these characteristics, the examination of his role moves on to his development at Vista del Mar. This is chosen because it demonstrates the widest range of structures that he, as an elite developer, was able to draw from to achieve personal, party and public benefits.

7.3.3 The Political Ecology of Vista del Mar: The Vista del Mar (VDM) development, brought to fruition by Garcia's company, the Bella Vista Group Ltd. ('Developers Who Deliver'), resulted in the clearance of 121ha of mangroves to create roughly 1,300 lots. This project, the company and the developer behind it, took centre stage in the escalation of mangrove clearance during 1990/91. VDM was the largest single coastal development ever undertaken in Belize, but nonetheless was instigated without any public consultation or Environmental Impact Assessment. Furthermore, environmental protection regulations in existence at the time were ignored. As shall be illustrated, the location, planning and

construction of this project, and the Land Reclamation Project of which it was part, was delivered by the PUP entirely as a *fait accompli*. It was the product of three central PUP figures, a core group of the country's political elite and a group of old friends. The VDM project got underway in March 1990, a few months after the PUP were returned to government. When eventually in the public eye in 1991, the project precipitated a flurry of very public allegations of corruption and nepotism by the opposition UDP party. A war of words unfolded in the media during the following months, but failed to alter the development's progress in any way. By this time, the land had been cleared, drained, filled, and houses were being built.

A lack of transparency, rudimentary planning and significant mangrove impact are the characteristics of elite involvement in this development. The first issue to cover is whether these characteristics arose because of the involvement of elite individuals, and whether this involvement prejudiced the sustainability of mangrove exploitation.

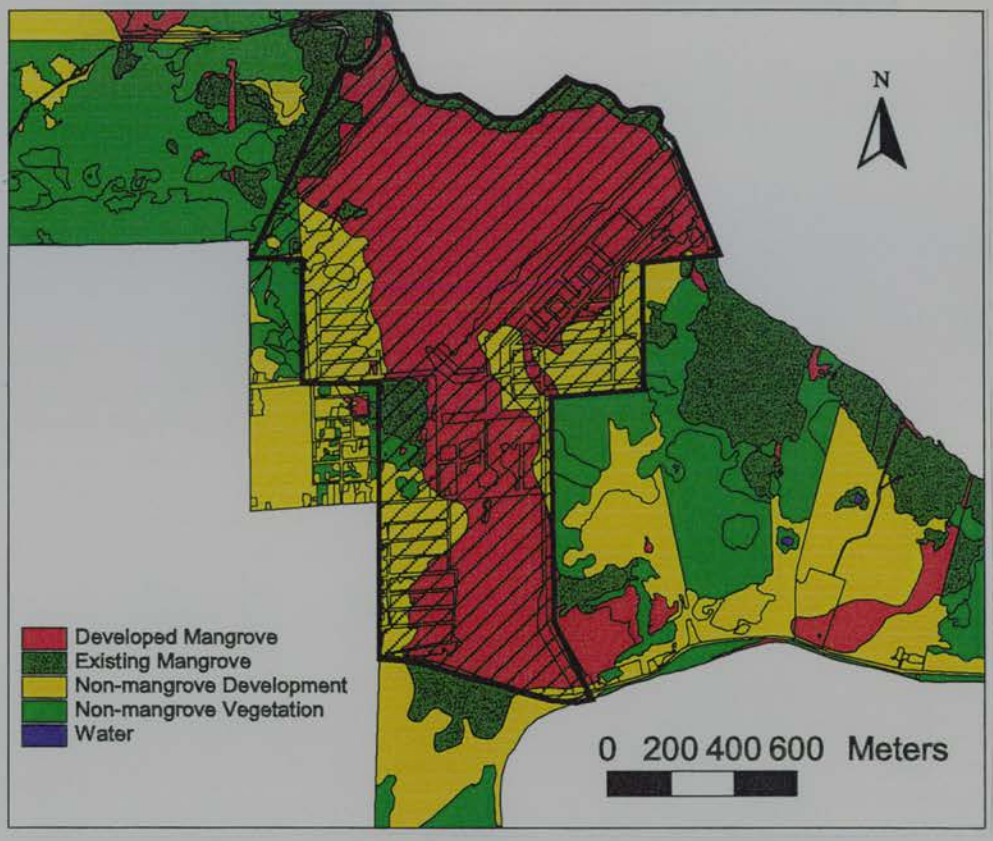
Secondly, the development ideology needs to be considered as it set the framework in which the ruling elite and developer elite were operating. As Garcia himself described in his proposal letter to the Commissioner of Lands and Surveys (also the Chair of the LUA)

> 'This project is created under the mixed economy, a national policy to encourage and support the private sector in the development of the nation and the public sector will take its share in the construction of the infrastructure'.

The issue to examine here is whether access to this 'support' arose simply from Garcia's status as an elite developer with good political connections. After a brief illustration of the development site, the answers to these questions are examined next.

Site profile: The VDM project is located at M 8 ½ on the Northern, between central Ladyville and the sea. Its location and impact are shown in Figure 53 and Plate 24.

Figure 53 The location and mangrove impact of the VDM project



Source: Interpreted from 1993 colour air photo enlargements (approx. scale 1:8,000), transferred on to ArcView GIS

Plate 24 Looking north over the Vista del Mar housing project

Elite privileges for Garcia at VDM? In response to these questions, an evaluation has been carried out of three main components of development. The first of these is the way in which Garcia obtained the land, the second is the project's progression in relation to environmental and planning controls and the third is its financing. Each of these is examined in turn, to identify signs of elite influence germane to the project's impact on mangroves.

Privileges in getting the land? According to PUP sources, the land for VDM was leased from the government for £6,163 (Belize Today, July 1991:19) [6]. This tallies with a cost based on the standard £51 per ha levied by the National Estate Office for the category they class as 'undeveloped swamp land'. Garcia admitted that this was not much to pay for such a large area (pers. comm. 1997), but it is, nonetheless, the standard government rate. In terms of its cost therefore, there was no 'special deal' for Garcia.

In actually securing this parcel, LSD records show it had formed part of an original 177ha lease made to Caribbean Shrimp Ltd. This was later reduced to 62ha and then cancelled in August 1987. However, as these changes were all made during the 1985-89 UDP administration, there was no undue interference by the PUP ruling elite in making the land available. Furthermore, the size of the parcel is not uncharacteristically large. Areas of this size are regularly leased out by the government for development purposes. Therefore in respect of the land, there were no special privileges extended to Garcia.

Privileges in the planning and permitting process? Here, evidence was found that Garcia used his position and support from Marin to push through his development without any hindrance from the departments whose responsibility it was to enforce environmental regulations. This arose in his dealings with the LUA. Garcia was one of its two political appointees and therefore was effectively helping to assess the application of his own development. Instead of leaving the room while it was discussed, he guided it through in collusion with the Permanent Secretary of the Ministry of Natural Resources, present to state his Minister's views and as the LUA Chairman.

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[6] The lease was Ministers Fiat No. 60 of 1990, according to LSD records.

The Minutes of the LUA meeting show that VDM was first discussed on March 16th 1990. At that March meeting, they describe how Garcia made a 'comprehensive and detailed description of the VDM project' noting that 'matters such as drainage will be adequately addressed' (LUA Meeting Minutes 18th March 1990). At the end of the presentation, the CFO questioned the legality of mangrove alteration but Garcia responded that his company was 'not presently doing this'. This was the end of the matter. Analysis of air photos from the period shows that, to the contrary, mangrove clearance was already taking place. This was in contravention of the mangrove regulations, as no permit had been requested or approved. However, Garcia was clearly not prepared to sanction any environmental interference in the project, and openly ignored the CFO's legitimate point in front of the other heads of departments present.

With no other environmental comments, the Chairman said that it had the full support of the Government of Belize and that the LUA would recommend concurrent provisional and final approval. The development was therefore approved without any conditions being attached. That these approvals were simultaneously granted is not without precedent, but is indicative of the project's rubber-stamping by the LUA. Scrutiny of all LUA applications show that this fast-track processing of applications to sub-divide land occured in only 37 of 1664 cases (approximately 2%) over 1986-1993.

Analysis of Garcia's influence on the project's passage through the LUA does reveal his elite influence in operation. Even though it might be argued that the project had government support, it should still, in theory, have been open to modification to ensure basic planning standards were met and environmental laws complied with. It was still a private project after all, subject to the laws governing such developments and the LUA was the main planning body operating at the time. By comparison, the adjoining residential sub-division to the south was subjected to modification and took three years to obtain final approval, while Garcia ensured that drainage of his site was allowed to pass through their development [6]. In his dealings with the LUA, Garcia was able to over-ride and ignore mangrove legislation and other planning requirements because of his elite status.

[6] See LUA sub-division application numbers 348, 746 and 866, made over the period 1990 to 1993 for the Taiwanese-owned company Evergreen Investments Ltd.

Special privileges in relation to project finance? The financing of VDM caused considerable controversy and accusations of corruption and nepotism, allegedly related to elite interference in the project. In mid-1991, the Social Security Board, recently established by the PUP, paid Garcia's company $1.8 million to provide 246 fully-serviced house lots. This led to an outcry from the UDP opposition, who portrayed this as a nepotistic pay-off to a political supporter using public money. A lively partisan political debate erupted in Parliament and the newspapers, with claim and counter-claim exchanged each week in the House and respective party press. The critical issue in relation to this thesis however, is to establish whether or not Garcia obtained access to this finance because of his elite status and political connections. If he did, this is another example of mangrove clearance facilitated by the developer's elite status.

The issues to be weighed up in answering are encapsulated in an article in the Belize Times (4th July 1991). Reporting on a parliamentary debate, it stated

> 'If you had heard Barrow's (the UDP Deputy Leader) presentation in the House last Friday, it would have seemed that the PUP Government had squandered Social Security funds, that VDM Co. had raked huge profits, (and) that a behind-the-door deal had been uncovered. Barrow charged that Javier Garcia had collected $1.8 million from Social Security for a land transaction which Garcia bought from the Government for over Bze$19,633....
> There was no squandering of Social Security funds as investment in real estate is very safe and highly profitable with handsome returns to the tax-payers of Belize.
> There were no huge profits for Javier Garcia since land reclamation and land development are expensive undertakings.
> Javier Garcia was not paid $1.8 million ..... but has so far only received $600,000. The Government will also receive free of cost from Garcia 300 filled lots for Belizeans'.

Significantly, the article omits a rebuttal in response to the way in which the decision was made. This point is returned to below. Whether or not this payment did result from Garcia's elite connections however, can best be judged by the outcome of the Social Security Board's $1.8 million investment. According to the late Meb Cutlack, businessman and owner/editor of The Belize Review (June 1991).

> 'If you take politics out of the equation and analyse it purely from an investment point of view, then we defy any critic to come up with a better or safer area to invest in than domestic housing' (p. 40).

Cutlack was also the owner of a similar piece of land adjacent to the City and ripe for development (Bolton's Bank), so he may have seen advantage in extolling the benefits of such projects. His opinion therefore has to be interpreted with some caution. Instead, using data on the return of the Board's investment, albeit supplied by the PUP's Belize Times, it does seem that its investment was justified. By 1992, the 246 lots sold to them, plus the 300 lots that Garcia provided for government had a combined value of $5 million (Belize Times 13th September, p. 3) [7]. This represented a rate of return of over 36% in less than two years. Confirming such rises in the value of VDM property, Respondents 17 and 14 provided examples of ten-fold increases in property values on the site over the period 1990-1995. On these pieces of evidence, the Board's contribution to VDM can be interpreted as a shrewd business investment, made independent of Garcia's elite status.

On the other hand, Garcia's friendship with Fonseca, Price and Marin may have helped secure the trust of the Board, especially as it came under the Ministry in which Price was head and Fonseca was a Minister of State. Evidence for any connection has proved elusive, although it is noteworthy that Price took the unusual step of personally making a public announcement and press release in support of Garcia and justifying the expenditure of this public money (e.g. Belize Times 14th July, p. 16, Belize Times 21st July, p. 3). This would suggest that Price had been personally involved in sanctioning the disbursal of the funds to his long-time friend.

[7] Together, these covered 22% of the site.

To further assist in distilling the significance of Garcia's elite status in obtaining these funds, it is also instructive to note that he has been the only developer to receive such an investment. It is also illuminating that denied a similar payment, Pappy Peña's Punta del Este project failed to come to fruition (see below). Although friends with the Minister for Agriculture, Peña lacked the top level political connections of Garcia.

On balance therefore, it seems that Garcia did secure the investment from the Social Security Board because of his elite connections, but that it was also a sound investment judgement on their part. It was not therefore nepotistic in the sense that the UDP accused, in that there was no evidence that the money went into Garcia's own pocket. However, his particular position did secure the money that enabled the project to succeed, and therefore permanently convert 121ha of mangrove forest.

7.3.4 Insights from the VDM project and Garcia's Role: Given the evidence above, four factors account for Garcia's role, the way in which the project was implemented and its resulting impact on mangroves.

Firstly, it has to be seen in the context of ascendancy of private/public partnerships in economic development. This ideology, described in Chapter 4, was vigorously applied to the housing sector by the PUP. It found favour with their elite since it legitimised the type of co-operation which generated particularistic and universalistic benefits simultaneously. The VDM project however, represents the reality of this approach in a developing country context. Specifically, it demonstrates that neither the ruling elite nor their favoured elite developers sanction sustainable forms of development, because these reduce both types of benefit. Furthermore, this engenders a lack of transparency in the project's formulation and execution. In combination, this results in a development momentum which prevented VDM being subjected to any objective scrutiny or assessment.

Secondly, input from technical specialists is resisted, and instead, the project design is completed based on the personal experience of the elite individuals involved. The level of planning for VDM was therefore rudimentary, with no qualified planning input. The fact that the institution meant to ensure proper development, the LUA, was in the control of

Garcia and his political supporters, meant that in this case it was also prevented from having any design influence.

Thirdly, and also demonstrated by the evidence from the LUA, no enforcement was permitted of environmental protection regulations. This eliminated the opportunity for the protection of any mangroves at VDM, through the retention of mangrove buffers or their use to stabilise the newly created canal banks. Not only did this lead to the clearance of 121ha of mangrove, such exceptions to the law have an indirect knock-on effect. People carrying out smaller clearances on their properties repeatedly justified their failure to get a permit by citing 'those big guys can do what they want so why shouldn't we'. This disparity reduces the validity of the law in peoples' eyes and the resulting level of compliance.

The final point relates to the timing of the decision to go ahead with this project. The evidence shows that this was taken by the PUP executive in advance of them coming to power. Therefore, any attempt to negotiate environmental protection measures once the election had been won was futile, and plans and sites had already been decided.

With VDM, impediments to meeting housing needs were overcome by the alignment of a combination of influences and events. A development ideology was in place that legitimised the linking of the elite developer with the ruling elite, who between them had the maximum range of resources to marshal, in order to meet private, party and public needs. Importantly in such a small country with a limited entrepreneurial base, Garcia had come to the fore, an individual capable of marshaling managerial capacity, machinery and technical know-how to get the job done. His direct access to financial resources allowed the removal of another major obstacle that commonly inhibits development in Belize. Given the combined private, party and public benefits that could then accrue, this imbued the project with an unstoppable momentum, one which mitigated against the protection of mangroves in any form.

7.4 The Second Tier of Elite Developers

This section provides a far briefer profile of the second tier of the developer elite involved in mangrove clearance for housing. The intra-elite relations of the three individuals concerned are much less complex, and the number of mangrove developments in which they have a stake is much more limited. All are PUP supporters who obtained large leases in

mangrove areas in order to carry out development projects. The three individuals concerned are Arnaldo Peña (real estate and general businessman), Tony Castillo (hotelier) and Tony Zabaneh (agro-industrialist). In these cases, comparable depth of analysis of their developments is unnecessary because most elements are similar to the above. It is necessary only to report the significant differences in the motivations and mechanisms involved. In addition, because a good rapport was developed with two out of the three individuals (Peña and Castillo), the manifestations of their elite status were more easily ascertained.

7.4.1 Special Privileges in Relation to Land? The main characteristic these individuals shared that led to their impact on mangroves was the access they secured to large parcels of national land. In each case, substantial leases were awarded shortly after the PUP returned to power. In Peña's case, this was the land for Punta del Este, part of Marin's Land Reclamation Project. It covered 250ha of dwarf basin mangrove and fringing mangrove forest on the western fringe of Belize City (see Figure 38, p. 145 and Plate 25). This was a low productivity area, where the main beneficial function of the mangroves was the minimisation of coastal erosion (Posford Duvivier 1997). He was also given a major lease on Turneffe atoll, an activity related to tourism and therefore considered below, under Section 7.5. From examination of the LSD's Land Tax records, Tony Zabaneh had obtained a lease for 20ha to the south of Dangriga (Plate 26). This was basin and fringing forest, associated with Commerce Bight lagoon and its egress into the sea. Ecologically, this was a relatively significant source of organic detritus into the local marine food chain, so its clearance was counter to sustainable mangrove use. Finally, Tony Castillo obtained a lease to a large area just to the south of Corozal (Grant 407/1991), covering approximately 405ha (LUA records). This area is associated with the egress of the New River drainage. Its clearance was less ecologically significant because the nearshore habitat is depauperate due to the combination of water depth, salinity fluctuation and benthic sediment type.

With all these leases, the common characteristic is the way in which elite connections were used to obtain them. All three individuals are personal friends of Marin (Minister of Natural Resources), the member of the PUP ruling elite responsible for allocating national land. Secondly, as Castillo, explained

> 'I gave money towards party funds and got the land
> in exchange. You know, the Minister and I are good friends'.

Plate 25 **View westwards over phase one of Peña's Punta del Este project**

Plate 26 **View south showing the Commerce Bight Road, Commerce Bight Lagoon and Zabaneh's illegal mangrove clearance**

The characteristic transaction here is that the land is secured by a financial payment, but not into the Treasury via the National Estates Office, as should be the case when leasing state land. The contribution was made by the PUP political supporters directly into its campaign fund for the 1989 election, in exchange for the promise of land. This 'pre-election' component to land development decisions is similar to the Land Reclamation Project. The extra evidence here underscores the importance of *timing* in efforts to intervene resource use decisions. In this case, projects which seek to influence land allocation after the election risk rejection because they may require the ruling elite to renege on intra-elite commitments made at an earlier date. This situation repeatedly arose during the FPMP and helped to account for the failure of Marin, Dito Juan and Richard Belisle to implement FPMP recommendations (pers. obs. and Respondent 29 and 30).

What is also critical to the impact on mangroves is the way in which the sites were selected. Both land use planning and sustainable development incorporate the concept of 'rational' land allocation based on its suitability for different purposes. However, in the case of Peña and Castillo (Zabaneh would not be interviewed), they chose the areas they wanted to develop (Peña pers. comm. 1993 and Castillo pers. comm. 1997) then asked Marin if he would arrange it for them. In making their choice, they used their knowledge of local land ownership and where they saw maximum development potential. Castillo saw the mangrove as

> 'no good for anything else, and anyway, it was the
> only national land around'.

No reference is sought from development control agencies because of the fear that restrictions will be placed on the choice of land. The developers therefore go straight to their friend, the Minister, and ask for the area they want, in return for their contribution to party funds. Given this arrangement, the Minister is not inclined to refuse on the basis that the site is environmentally inappropriate. Therefore, the land is allocated on economic grounds as part of intra-elite relations. This is unlikely to be environmentally rational or sustainable, since the basis for the developers' economic choice is profit maximisation.

7.4.2 Special Privileges in Relation to Planning and Environmental Regulations? In this context, the three projects did not receive the same treatment. Only Peña and Castillo applied to sub-divide the land. LUA records show that Peña's project was subject to

repeated revision. This included reducing the density of housing and retaining mangrove buffers, both of which decreased the number of lots on the private part of the development and therefore his profit (Peña's development was similar to Garcia's in that it included the provision of public house lots donated to government).

Castillo's development, known as 'La Horizons' was considered 'quite unacceptable and un-feasible' by the LSD Physical Planner in his recommendation to the LUA Chairman (LSD records). Nonetheless it was given Provisional Approval in May 1993, requiring only that 'an EIA was carried out'. It proceeded without any significant modification and no EIA was produced.

The difference is accounted for by the closer personal friendship Castillo enjoyed with Marin. It is also evident that the difference in the two individuals' receptiveness to environmental regulation contributed to these differing levels of intervention. Castillo shared similar views of environmentalists to Garcia and fiercely resented bureaucratic interference. In contrast, Peña was willing to comply with the FD and LUA regulations to improve the quality of his project. His was a far more receptive attitude (Respondent 3 and 21). Therefore, in there dealings with the LUA, Castillo did benefit from his elite connections. In contrast, Peña made no effort to do so, due to his greater will to cooperate.

Examination of the FD's mangrove files reveals a similar response to compliance with mangrove laws. Initially Peña failed to apply for a mangrove permit, and the CFO did not pursue him over this 'because it was a political thing' (Green, pers. comm. 1992). The CFO implied here that the project could not be altered because Peña had political connections and Ministerial support. However, with subsequent phases he was willing to comply and keen to establish his environmental credentials. In comparison, neither Zabaneh nor Castillo applied for permits and therefore both clearances were carried out illegally. The FD did not feel it feasible to prosecute these individuals because of their political connections (Respondent 1 and 21). Furthermore, the Forest Rangers for the areas reported that they did not want to interfere with the developments for fear of reprisal. Clearly, the elite status of Zabaneh and Castillo contributed to their ability to ignore the mangrove regulations without fear of legal retribution. Therefore, in relation to compliance with planning and environmental regulations, these individuals were able to secure privileges arising from their elite status, although Peña chose not to exercise his.

7.4.3 Special Privileges in Relation to Financing? As already referred to above, obtaining investment finance has been a considerable hindrance for developers in Belize. In Peña's case, because he was only on the second tier of the PUP developer elite, he could not access the state funds that Garcia successfully did. This was the principal factor for the ultimate failure of his project (Peña, pers. comm. 1993), as his initial investment capital was used on clearing and filling. This left no money for the provision of site facilities (electricity and water), which made lots difficult to sell. Castillo had greater personal capital to invest and his site development was completed [9]. In Zabaneh's case, because family members are widely believed to be one of the country's principal drug traffickers, the development is likely to have provided a means of laundering proceeds from this activity.

7.4.4 Further Evidence of Elite Influence: This second tier of elite developers carried out housing projects which lead to the transfer of 675ha of mangroves from state to private ownership. They also lead to the clearance of approximately 213ha of mangroves.

In the way that these projects came into being, further evidence has been identified of the special privileges extended to these individuals because of their elite status. The nature of these privileges mitigates against the rational allocation of mangroves. They also undermine the enforcement of the regulations designed to encourage sound planning and sustainable mangrove use. Finally, it is clear that the critical point in the decision making process, the allocation of the land, is negotiated at an early stage. After this intra-elite 'deal', the ruling elite and developer are unlikely to sanction any interference in its exploitation.

7.5 The Role of Elite Individuals in Tourism Development

In this section, analysis is provided of the main type of elite involved in tourism development, namely the ruling elite. This group is comprised of the UDP's Henry Young, and the PUP's Mike Espat and Glenn Godfrey. Young's involvement in Placencia and Espat's in the Orange Point Marina development have already been examined in the previous chapter. Godfrey's involvement in the exploitation of mangroves in Caye Caulker is examined in more detail because his role was more substantial in terms of the area affected.

[9] Subsequently however, following the UDP's victory, the Minister of Natural Resources (Dito Juan) delayed Final Approval for three years. Without this, lots cannot be sold, and La Horizons was bankrupted. This is a typical form of party-political retribution common in Belize, where these 'stakeholder shifts' result in sudden changes in development activity.

Sources for this were local residents, government officials, FD and LSD records. Godfrey himself was not prepared to be interviewed.

7.5.1 Godfrey and the Pro-development Nexus - 'God Smiles on the Chosen Few [10]':

When the PUP regained power in 1989, tourism was in its ascendancy and Belize was increasingly positioning itself as a fashionable eco-tourism destination. Glenn Godfrey, Minister of Tourism and Environment and member of the lawyer/politician elite, took office and pursued an active interest in the industry's growth. Adept at 'talking the talk' of sustainable development, at a superficial level, at tourism conferences hosted in Belize, he lauded the virtues of eco-tourism and environmental protection (e.g. at 'Destination Mangrove' Conference held in January 1993). In practice, he vigorously pursued a pro-development ideology, using his elite position to promote growth for the benefit of his personal business interests. In doing so, he formed alliances with local business people of an equally pro-development mentality. In this way, he headed the pro-development nexus.

The way Godfrey pursued these interests in relation to the development of Caye Caulker is now examined, in order to highlight the mechanisms he used and the resulting impacts on mangroves.

Godfrey had been steadily acquiring land on Caye Caulker over the 1980s and by the 1989 election, he owned 19 lots in the centre portion of the Caye (Respondent 4). He was also the PUP area representative.

Up to this point, residents and tourists travelled to and from the mainland by water taxis, which ran a frequent daily service taking 35 minutes each way. Godfrey wanted to build an airstrip on the island in order to increase access to the Caye and to encourage more up-market tourists instead of the 'back-packers' it predominantly attracted. Both would have the effect of increasing the value of land on the caye, a significant particularistic benefit motivated by profit. The airstrip and the increased intensity of development it encouraged however, went directly against the eco-tourism and sustainable development ethos. The need for the airstrip caused considerable debate on the island. The majority of residents wanted government intervention in the form of a water treatment plant because groundwater, from which household supplies were taken, was becoming increasingly polluted. This was

[10] Quote from Respondent 4.

from a combination of the leakage from cracked septic tanks and the effluent from soak pits. Tourists and locals were increasingly complaining that the water smelled tainted and was discoloured. That this was felt more by those in the tourism trade meant that hoteliers in particular were calling for the government to provide water treatment. This would have simultaneously benefited the nearshore environment, which was suffering from the first stages of nutrient enrichment (eutrophication).

Against the majority of local support, in 1991 Godfrey took the decision for the government to proceed with the airstrip (Respondent 4). It cut across the south end of the caye (Figure 44, p. 156), replacing 4.3ha of basin mangrove forest for the strip itself plus an area for a borrow pit to provide fill.

Not only did this have a direct effect, it also opened up the caye to more intensive development, by encouraging wealthier visitors, better able to afford more luxurious hotels (with air conditioning, swimming pools etc.). The provision of these extra facilities and services has put an extra pressure on the Caye's environment, rapidly moving it towards its 'carrying capacity'. Furthermore, to secure the support of the Caye's wealthiest PUP supporters, the Vega family and Lester Marin, Godfrey awarded them leases on the pristine north of the island in return for supporting the air strip (Respondent 4). This was in the area that the CZMU had been lobbying to have declared a nature reserve (Richard Belisle, pers. comm. 1996). Whilst the Village Council supported this designation, Vega and Marin successfully opposed it by helping Godfrey to 'buy off' the Village Chairman, getting him to over-rule the Council's opposition (Respondent 4). This type of mutually beneficial activity between the top ruling elite (Godfrey) and their local agents (Rodriguez, Marin and Vega) ensures those in power achieve their goals, regardless of having to operate in a democracy.

The unfolding pattern of development on Caye Caulker again reflects the way in which elite individuals exercise influence over development decisions. The airstrip and development option chosen was not the locally preferred one but the one which generated greatest private financial return for Godfrey. Its impact was to undermine the sustainability of tourism on the Caye, because, as Godfrey intended, it significantly increased the intensity and momentum of development. As Respondent 4 described,

> 'One selfish powerful individual is responsible for the direction this caye has gone' (pers. comm. 1997).

Caye Caulker provides this further evidence of elite influence guiding development to best suit their own profit-motivated requirements. In so doing, Godfrey undermined the sustainable use of mangrove and sustainable development of this whole caye [11].

7.5.2 Elite 'Fixers' - The Operation of Developers on Turneffe Atoll: The rapid take-off of tourism towards the late 1980s put a premium on picturesque coast which was near to good dive sites and beaches. Turneffe was the only large area meeting these criteria which was under state ownership and consequently available for the Minister of Natural Resources to give out for patronage purposes. Tourist resort developers obtained large leases from the PUP government following their 1989 return to power, and the elite issues associated with this trend are now considered. The aim is to examine the stakeholder interaction associated with the development of coastal land for tourism, in particular how the developers got access to these areas. The assessment is to illuminate the socio-political characteristics of the types of tourism developer identified in Chapter 5. The two developers are Arnaldo Peña and Al Dugan and the other significant stakeholders are the atoll's fishermen.

Keeping 'arm's length' but securing advantages by using an agent: In early 1990, Al Dugan, American owner of Blackbird Caye Ltd. was awarded a 405 ha lease on Blackbird Caye, covering the greatest area of high windward land on the atoll [12]. Originally publicised as 'low-impact' cabañas and bunk-house accommodation for 50-150 people, with an airstrip for access, it is also the only new tourism project to come to fruition on the atoll over this period (Figure 54, Plate 27). The feature of interest here is that Dugan (and the other tourism real estate developers identified on San Pedro), do not seek direct contact with the ruling elite. The most likely reason for this is that they do not wish to be associated with any particular party in case there is a change of government. Instead, what the LSD records reveal in this case, is that Dugan retained the services of a local agent, a Belizean businessman with strong PUP connections. All the transactions for the development, including the application for a lease and for sub-division, were done through this individual, Ray Lightburn. He is close friends with Marin, the PUP Minister in charge of lands, and this is the most plausible explanation of how this extremely large lease was obtained.

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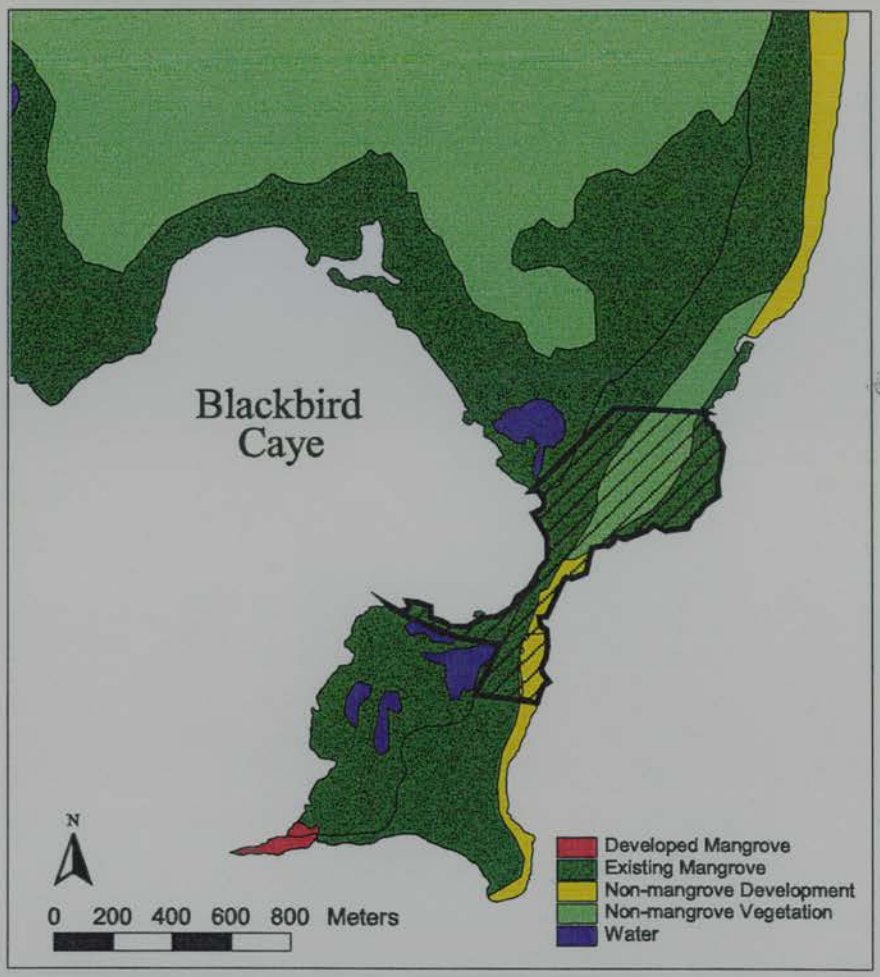
[11] During the last fieldtrip to Belize (Sept. 1997), Vega had illegally cleared mangroves on the Caye. Despite protests from local conservationists and the CZMP, the FD did not feel in a postition to prosecute Vega, because of his powerful position on the island and political connections (Respondent 4, Respondent 13). This is the type of knock-on effect that Godrey's influence has led to.

[12] Once the survey was completed, the property was found to be 455 ha, according to LSD's validated Plan Entry 1293.

Figure 54 **The location and land cover impact of Dugan's resort on Blackbird Caye, Turneffe Atoll (prior to mangrove clearance)**



Source: Interpreted from 1990 B/W air photos (approx. scale 1:44,000), transferred on to ArcView GIS

Plate 27 **View west over Dugan's resort on Blackbird Caye, Turneffe Atoll**

Peña: an elite developer without an anti-environmental attitude? At the same period, Peña's company Belize Resort and Development Ltd. also obtained land for a second major resort. A 50 year lease of 55.5ha was secured at Grand Bogue, but LSD records show that for Bz$164,400 was paid for this land (Minister's Grant 332/1990). No special favours seem to have been extended on the basis of his personal connections, to secure the land. The FD records also show that Peña obtained a mangrove alteration permit, in advance of any clearing being undertaken. Again, he displayed uncharacteristic behaviour for an elite individual and complied with the mangrove regulations. His explanation for this was that he knew the mangroves were important, that it didn't cost him much, and that he did not want 'any bother from the environmental people' (pers. comm. 1993). In an interview in the March 1991 issue of The Belize Review magazine, he went as far to say that

> 'We are very aware that the beach and sea mangrove is what holds the land together and are certainly not about to start eroding our own island'.

The fact that the development did not progress beyond initial land preparation, makes any firm conclusions hard to draw. Peña again failed to raise the necessary capital to implement his project, and the minor impact on mangrove proved only temporary. In relation to his influence however, it does seem that, despite his elite status, Peña did see value in protecting mangroves and was prepared to follow the regulations. This is consistent with his behaviour in relation to Punta del Este, discussed earlier.

The impact of non-elite stakeholders on the tourism developers - the case of Turneffe's fishermen: Fishermen's use of mangroves has not been considered up to this point because it has a minor impact and little bearing on elite activities. Their conflict with the tourism developers on Turneffe is however, a significant exception and is therefore briefly considered here.

Towards the end of April 1990, the allocation of leases to these tourism developers on Turneffe led the fishermen to complain directly to the Prime Minister. Allan Bevans Green, Chairman of the Belize Fishing Co-operative Association wrote 'we respectfully address you on a matter that has of late become of great concern to the fishing fraternity .... We understand that recently large tracts of mangrove have been leased to at least five persons ....

ostensibly for tourist facilities. Already the mangrove is being cleared from those areas - we hope the relevant laws are being complied with - immediately affecting the breeding grounds of the spiny lobster. This will have a disastrous impact of (*sic*) juveniles and a deterioration of existing stocks' (letter dated 23rd April 1990).

Three characteristics are significant about the fishermen's intervention. Firstly, their claim to the area is well-established and legitimate. Also, their concern that their livelihood may be adversely affected by the clearance of mangroves is genuine, given their dependence on the lobster harvest. Secondly, their complaint is made through a well-established representative body, the Belize Fishing Co-operative Association. Thirdly, by virtue of their numbers (approximately 3,000 full-time fishermen, according to the Fisheries Department) they are a relatively numerous stakeholder group whose support the politicians would seem to need to maintain. Despite all these characteristics, none of the developers had their leases cancelled or curtailed and Dugan was not prosecuted for illegally clearing mangroves. Instead, Marin 'bought off' the 37 fishermen, by providing them with secure leases of 0.4ha each. This put an end to the fishermen's complaints.

There are two plausible interpretations of these stakeholder interactions. Firstly, that the fishermen were never genuinely concerned about the loss of mangrove but just objected to the 'newcomers' on Turneffe getting large leases when their tenure were not officially recorded. This seems unlikely because the fishermen would have asked directly for their leases to be secured. The second, and most likely reason, is that the fishermen were concerned about the impact of development on their livelihoods. Despite this legitimate concern however, they failed to curtail mangrove clearance or to get the size of the resorts reduced. The land holding secured by the tourism developers therefore remained undiminished. Due to their elite status and connections, these developers remain unaffected by the legitimate concern of local fishermen, who wanted to protect the mangrove habitat for its fisheries value.

7.6 Conclusion - Additional Findings on Elite Influence in Mangrove Use

The main finding is that there is considerable elite involvement in mangrove alteration in the developments examined in this chapter. The precise influence varies according to differences at three levels. *Individually*, elite stakeholders pursue a dynamic mix of private

and public objectives. This depends on the person concerned (for example Natural Resource Minister Juan has pursued more private benefits than Minister Marin). It also varies over time, particularly in relation to the election cycle. Furthermore, it varies because individuals have different perceptions of the environment, development needs, and other stakeholders which determines their receptiveness to sustainable mangrove use.

Secondly, the impact on mangrove exploitation depends on the *elite group*. This affects the structural resources that the individual can access in order to pursue their objectives. In the case of the ruling elite for example, the Minister of Natural Resources has unrivaled control over the allocation of national land, through his legal position and control of the LSD.

Thirdly, the *intra-elite support* determines the influence an elite individual can bring to bear on mangrove use. The networks, maintained through mutual support, cement relations between elite groups. In many cases, particularly with lawyer/politicians, this is facilitated by the joint membership of certain individuals between these groups. The most significant type of intra-elite support in relation to mangrove use has been between the ruling and developer elite. Exaggerated by the private/public development ideology, the need to sustain intra-elite support reduces the ruling elite's scope to implement sustainable development.

Finally, these socio-political elite strata operate at different *spatial* scales. An individual elite developer may have sufficient resources to exploit one or two sites. Elite groups will be able to have a far wider impact, over-seeing exploitation nationally, but not able actually to carry it out in all cases because of the practicalities of doing so. By setting up intra-elite networks, this can be effectively achieved through all parts of the country.

These case studies have revealed the more detailed characteristics, motivations and mechanisms which account for elite resistance to sustainable mangrove use. They are also the final evidence gathered in support of the thesis. The final chapter summarises the research findings, considers their value, recommends further research and highlights measures which can improve the implementation of sustainable mangrove use.

Can Sustainable Mangrove Management Work? 8

This research set out to investigate the role of elite stakeholders in mangrove exploitation in Belize between the late 1980s and early 1990s. In this final chapter, the findings are summarised and evaluated. Based on this assessment, recommendations are also made for enhancing the implementation of sustainable mangrove development.

8.1 Research Findings: Mangrove Characteristics and Elite Stakeholder Interactions

8.1.1 Mangrove Extent and Community Characteristics: The ecological surveys carried out by co-workers and as part of this thesis have identified 20 different mangrove sub-communities in Belize. They are comprised of the species *Rhizophora mangle*, *Avicennia germinans* and *Laguncularia racemosa* and grow in a range of forms from dense forests to sparse scrubs and savannas. Mangroves occur on Belize's three atolls, the majority of the 1,065 cayes and approximately 90% of the coastline. Along the mainland, they range from a narrow belt only one or two trees deep to extensive mangrove savannas over 20km wide. Mangroves also grow in lagoons, creeks and marshes up to 70km inland.

Based on remote sensing, field work and analysis of historical sources, these mangrove habitats are estimated to have originally covered a total of 79,162ha, equivalent to 3.45% of Belize's land area.

8.1.2 The Characteristics and Causes of Mangrove Alteration: Using field work, air photo interpretation, satellite imagery and GIS, the alteration of mangroves has also been mapped up to 1990. Ambergris Caye is the exception, and was mapped to 1988. A range of activities have been identified that are responsible for the conversion of mangroves. Foremost amongst these are housing, tourism, transport and aquaculture. As a result of these activities, by 1990, 2,239ha of mangrove had been significantly altered in Belize, a reduction of 1.9% from its original extent, leaving 98.1% intact. This proportion is perhaps higher than any other country in the world. It is also in stark contrast to other countries of both the Central American and Caribbean regions. The limited loss of mangroves does not, however, reflect any conscious conservation strategy by the Belizean government. Instead, it

is a symptom of the country's low population density and limited extent of economic development in the coastal zone.

In addition to this map-based analysis, examination of mangrove permits, sub-division and foreign ownership records shows that alteration is highly localised, reflecting the concentration of coastal economic activity in settlements. The main focus of development is Belize City. Land cover mapping for this area revealed a rapid escalation of mangrove loss by 1992. This, and further development in Ladyville, was primarily the result of the PUP's Land Reclamation Project. It caused unprecedented mangrove clearance to provide land for housing over the period 1989-1992.

Since the mid-1980s, and in addition to clearance for settlements mangroves have been converted for aquaculture and tourism. The growing impact these activities have had, results from the diversification of Belize's economy, the development approach was promoted because of its over-dependence on commodity exports. Prompted by its creditors as well as a desire to raise living standards, both the PUP and UDP achieved diversification by courting increased foreign investment and facilitating development. This has resulted in an increasing US influence and participation in the country's economy and political ecology of the coast. Diversification has also led to a considerable increase in the size of the pro-development nexus, whose exploitation of mangroves is driven by profit-maximisation.

8.1.3 The Identity and Motivation of Elite Mangrove Stakeholders: A range of elite individuals have been found to be intricately involved in mangrove clearance. The ruling elite have had the greatest impact. As well as pursuing personal benefits of income and kudos, they need to stay in power by securing the support of other elites and non-elites. This is done using patronage. This socio-political relationship accounts for the pattern of land development chosen by the ruling elite in Belize City/Ladyville.

In implementing the conversion of mangrove to provide land to allocate through patronage, the ruling elite have been assisted by elite developers. The individuals concerned, as well as maximising personal profits and party-political benefits, perceive mangroves as worthless. They view mangrove conversion as a universalistic service to the community. The combination of these motivations, leads to these individuals opposition to sustainable mangrove use.

8.1.4 The Environmental Nexus and Its Interaction With the Ruling Elite: In response to the escalation of mangrove clearance over the late 1980s, a counter-movement emerged that called for more sustainable mangrove use. Concerned by the adverse impact of clearance around the City and on a number cayes, local and international conservation NGOs, aid agencies and government technocrats increasingly promoted the adoption of sustainable management strategies from this period onwards.

As a result of the subsequent interactions between this environmental nexus and the ruling elite, there were two main indications that elements of sustainable mangrove management were being successfully adopted. Firstly, an increasing number of protected areas have been created. As well as protecting biodiversity, reserves were seen as the ideal framework in which to encourage eco-tourism, an activity seen as an appropriate means of combining both conservation and development goals. The second key component of the environmental lobby has been the passage of mangrove protection legislation in 1989. These regulations, again sanctioned by the ruling elite, created a framework for the enforcement of sustainable forms of mangrove exploitation.

Through these measures, it appeared that environmentalists had successfully directed elite behaviour toward sustainable development practices. However, more detailed examination has revealed that the ruling elite adopted these measures in order to help secure resources of foreign aid and personal kudos. The measures entailed no opportunity-cost to them or any other elite group on whose support they depended. Once in place, any restrictions these measures put on the allocation and use of mangroves are circumvented by the majority of the elite, either because they reduce the scope for private profit or diminish resources available for patronage.

8.1.5 Elaborating Elite Motivations and Influence: This is main principle which inhibits sustainable resource use. The self-interest of the ruling elite ensures that their choice of development trajectory will maximise private accumulation and the patronage resources available with which to stay in power. Given an electoral system which creates five-year cycles in which to achieve this, the elite encourage rapid exploitation of natural resources. The combination of these factors has accounted for the rapid rise in mangrove clearance and the unsustainable pattern of exploitation. Environmental measures, such as mangrove

buffers, reduce the area available to use for patronage and therefore carry an untenable political opportunity-cost for the ruling elite. Consequently, these measures are not adopted.

8.1.6 Supporting the Research Hypothesis - Elites Do Have a Significant Influence: The hypothesis this research tested was that patterns of, and approaches to, mangrove exploitation can be accounted for by the influence of elite stakeholders. Findings show that this is the case. Having arrived at this conclusion, it is appropriate to assess its significance and the way this understanding can shape efforts to implement sustainable mangrove exploitation. Both of these issues are considered below.

8.2 Reflections on Research Findings and Need for Further Work

This section highlights the contributions this research has made to the understanding of mangrove exploitation in Belize. It also identifies the work needed in order to take these insights further forward.

8.2.1 Insights into Elite Behaviour in Relation to Sustainable Mangrove Use: This research represents the first examination of elite behaviour in present-day Belize in relation to natural resource use. It therefore contributes a new social science perspective to CZM which up until now has been absent. The fact that this was obtained over a nine year period adds depth to the resulting analysis. In particular, it enabled the observation of a broad range of stakeholders, including from three different governments, confidences to be established with a wide range of respondents, direct participation in mangrove management with the FD and extensive access to government records. This combination provided a unique opportunity to study the dynamics of elite involvement in mangrove exploitation.

This research has also highlighted the relevance of many of the findings of elite research undertaken between the 1950s to 1970s, but rarely examined since. It is hoped that sufficient benefits have been demonstrated to encourage others to draw on this body of work to contribute to the analysis of environmental degradation in developing countries.

The most immediate scope for furthering investigations into elite behaviour is a full examination of the attitudes of the political elite and developer elite to the environment.

This is important to monitor because it evidently has such significant implications for the resource exploitation decisions that will be made.

8.2.2 Elite Influence - A Useful Contribution to Understanding Environmental Degradation in Developing Countries? In the context of mangroves in Belize, it has been shown that elite stakeholders have a considerable influence in their exploitation, and that this tends to favour unsustainable development. Similar conclusions are at least implied in studies elsewhere, by Hecht, Cockburn and Horowitz (*op. cit.*) for example in relation to deforestation in the Amazon. This suggests that an elite stakeholder theory of environmental degradation does provide a widely applicable theory of environmental degradation in developing countries. This theory specifically proposes that degradation results from the combination of:-

- their capitalist economic systems, based on profit-maximisation,
- their economic reliance on primary resource exploitation,
- their relatively young political cultures, in which particularistic goals of the ruling elite can be more easily sustained,
- the personal belief of the ruling and developer elites, and
- the predominance of patronage as a form of socio-political organisation. This itself is considered to be the result of lack of opportunity of the poor, and the extreme gap between them and the rich in society.
- In addition, certain environmental features also contribute to the degradation. Foremost amongst these are the external nature of many impacts, the lack of clearly defined property rights and the delay that often exists between cause and effect. These mitigate against socio-political responses that favour sustainable forms of resource use.

On the basis of this research, the combination of these factors account for degradation of mangroves. It is suggested that these form the basis for a general theory of environmental degradation in developing countries, that combines economic, social and ecological factors.

8.2.3 Stakeholder Shifts: The research also found evidence of the dynamic nature of stakeholder interactions. Of most significance were *stakeholder shifts*, sudden episodic changes in stakeholder composition or inter-relations brought about by new environmental, economic, international, or socio-political circumstances. The most obvious example is a change of government after an election. An economic change pertinent to the Belize case is the 1980s crash in world sugar prices, which precipitated the government's shift to favour tourism as a means of economic diversification. The mediation of economic relations through international trade agreements is another potential economic trigger for stakeholder shifts, in relation to commodities (e.g. the Lomé Convention - especially relevant to banana production) or trade in general (e.g. NAFTA). Environmental management policy and practice must in particular be alive to these sudden changes, and be able to respond effectively. This is considered further in the recommendations section below.

8.2.4 Insights Development Trends in the Coastal Zone: This research has assembled the most comprehensive and accurate data set on Belizean mangrove use in existence, allowing a greater insight into mangrove exploitation than has previously been available. Nevertheless, as examination of the summary data in Appendix 8 shows, this information is far from complete. Further research effort is needed to obtain missing data. This will enable the more comprehensive identification of mangrove stakeholders, particularly the land owners. This information can then be used to target management activities, particularly education and publicity on mangrove protection. This is returned to in the recommendations section below.

8.2.5 Insights Into Belizean Mangroves Communities: This research has produced new information on the nature of Belizean mangrove communities. The weakness is that ecological and physical resource functions of a particular site cannot necessarily be inferred from the sub-community type. This is because a site's functions may be affected by characteristics other than physiographic setting, vegetation structure and species, on which the categorisation is based. Nearshore bathymetry and proximity to other habitat types are just two factors that can for example, influence the resource functions associated with a particular mangrove area. Therefore, to enhance the usefulness of the categorisation, there is a need to add additional information which would enable the mangrove sites with the greatest resource value to be identified and targeted for protection.

8.2.6 Mangrove Distribution: This research has considerably refined the information available on the distribution of mangrove in Belize. A range of further mapping work can be done however, and these are listed in Appendix 6. Most significant in terms of mangrove management are: -

i. The extent and use of mangrove needs to be up-dated for the mid to late-1990s, to allow for continued monitoring of mangrove exploitation. This is particularly the case for Belize City and Ambergris Caye.

ii. A land parcel coverage needs to be created for integration with the mangrove, sub-division and aliens land holding data sets. This will enable a range of other analyses to be completed, as well as the targeting of management activities. In particular, by comparison with the mangrove permit database, this would enable the properties to be identified where mangroves had been cleared with or without permits.

8.3 Recommendations for Enhancing the Effectiveness of Sustainable Mangrove Management

In the light of the above research findings, recommendations are set out below that aim to improve the implementation of sustainable mangrove exploitation. At the beginning of this list are less controversial measures which are simple reforms of current practice and could be adopted relatively easily as they are likely to be acceptable to the institutions involved. The recommendations become increasingly radical, but reflect the belief that drastic measures are justified in order to avoid the long-term degradation of the environment that will otherwise result. These recommendations are unlikely to find favour with the majority of stakeholders involved in promoting sustainable mangrove use.

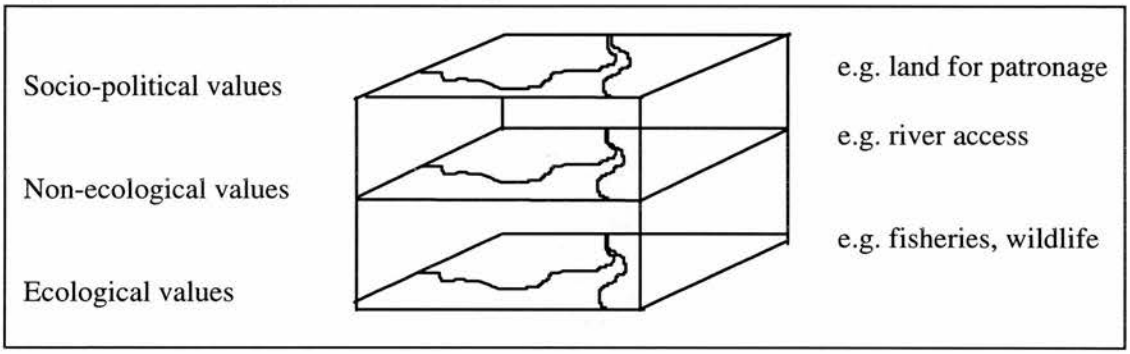
8.3.1 Less Controversial Recommendations to Improve the Implementation of Sustainable Development of Mangroves and Other Habitats: Below are the recommendations for actions that can be taken to improve the effectiveness of mangrove management and other environmental projects aimed at instigating sustainable development.

Modify procedures for carrying out stakeholder analysis: Present guidelines have been produced for carrying out stakeholder analysis (e.g. Grimble *et al.* 1995). When used to examine environmental issues, stakeholder analysis needs to consider:-

- the dynamism of stakeholder composition and inter-relations. This includes the need to take into account possible *stakeholder shifts*.

- the different way in which an environment's resources are perceived and valued by different stakeholders (Figure 55). This will give a more realistic understanding of people's motivations for using environmental resources and anticipating potential conflicts.

Figure 55 The types of value people attach to natural resources



In addition to the above, when being used to help to formulate aid projects (e.g. ODA 1995), stakeholder analysis needs to stress:-

- the importance of identifying elite stakeholders and any adverse impacts of projects and policies on them. Consideration can then be given to how their response may prejudice project/policy objectives being met. If this adverse reaction is likely to be significant, project/policy activities need to designed to overcome this, or the project/policy be halted. This will help to ensure that aid to promote sustainable development is used most effectively and not spent on activities that will ultimately fail.

Enhancing project formulation to take account of the risk of political interference: Since almost all natural resource management has socio-political consequences, it is

recommended that teams responsible for project formulation include specialist socio-political input. This will help to ensure that the characteristics and implications of socio-political relations are correctly identified. The fact that the FPMP preparation mission was limited to botanical, forest management, land use and institutional specialists does much to account for its failure to prepare for the political obstacles it faced.

Modifying the training and education of environmental managers: Given that the success of management is dependent on socio-political factors as well as environmental ones, the content of courses designed to train resource managers needs to reflect this fact. At present, the majority of courses concentrate on physical sciences. This situation needs to be rectified by broadening the curriculum of these courses to include relevant aspects of social and political science. This is an essential step to improve the capability of resource managers to understand, anticipate and avoid political interference in environmental management.

8.3.2 More Radical Modifications Based on the Findings of This Research: Implementing these recommendations is more likely to face opposition because it goes against the apolitical ethos of many of the organisations involved in conservation, such as IUCN and WWF. Conservation interests do have to respect the unassailable 'democratic' privilege of elected elites. This point is not lost on the ruling elite themselves, who frequently hide their activities behind indignation at 'foreign interference'. This is, in fact, a key strategy for minimising the effective role of outside conservation interests. In the light of such circumstances, the recommended actions open to environmentalists are given below.

Continue pressure to dismantle the clientelist state: As a side effect of the neo-liberal preference for the private sector and small government, economic reform at the behest of the IMF, World Bank and other creditors has cut back the opportunities for corruption and patronage. This reduces the leverage of elites and makes their tenure in government, increasingly dependent on their performance in legitimate economic management, rather than their ability to give handouts. Whilst environmentalists and these development banks make strange bed-fellows, the benefits of a reduced clientelist state are shared by both groups.

In addition to this measure, designed to diminish the sphere of influence of the ruling elite, there are other measures that can be taken that can side-step their reach. These form the next set of recommendations.

Help local activists take out private prosecutions against people breaking environmental laws: In Belize, as elsewhere, there is not a lack of legislation but a lack of capacity and political desire to enforce it. This can be overcome by environmental agencies funding private citizens to take to court those individuals who are breaking the law. This will help to increase the level of compliance with environmental regulations.

Environmental aid should be disbursed through legitimate NGOs, rather than to governments: To a degree, this trend has already begun to emerge in order to avoid misuse of funds by corrupt government officials. Whilst involvement of an NGO does not entirely preclude corruption, it gives donors far greater legitimate influence in the operation of that NGO. For example, conservation NGOs in Belize were regularly audited by USAID to ensure financial probity. Equally important, donors can also ensure that NGO staff are selected on the basis of merit.

Increase the money going in to land purchase: Within this NGO framework, a particularly effective way of ensuring objectives are met is to buy the land involved. PfB, the Belizean conservation NGO, have achieved this with maximum effect, securing over 50,000ha of forest, savanna and wetlands in which to carry out sustainable use. The £4 million spent on Belize's TFAP could have purchased approximately 30,000ha with £1 million left over for management. This would have secured the sustainable development of one area instead of ineffectively trying to impose it on a whole country. Since the price of land is steadily rising, the most appropriate strategy for environmentalists at present is to buy the maximum areas possible. Aid money can go on management at a later date, once these areas have been secured under private ownership.

Should there be a major hurricane that hits Belize's coast, and the likelihood is approximately one in 40, land prices will drop and this will be a good time for land to be purchased.

Modify CZM approaches to match the political reality of resource use: The findings of this research show that the model for CZM promoted internationally by IUCN (1993) and adopted by Belize is flawed. It fails to recognise and respond to the socio-political and economic interactions that in reality, govern resource use. The entire CZM process is orientated towards the production of plans and policies. As this research has shown, even if it politically expedient to adopt these, the ruling elite will not enforce them. The resources spent on planning need to be re-deployed elsewhere.

Instead, CZM efforts need to be re-directed to engage in the critical socio-political processes through which decisions are actually made. Firstly, the CZM process needs to identify and engage the people with particular influence on resource exploitation, i.e. the ruling elite and the developer elite. As shown, these individuals tend to belittle the value of technocrats, but do respect other individuals they see as worthwhile. These are the individuals through whom efforts should be made to change attitudes and influence decisions.

Secondly, to assist in this process, data collection needs to be re-orientated so that the resulting information produces meaningful insights into development pressures. Information on constituency boundaries, voting patterns, company shareholders, land owners and investors is far more significant to exploitation than the location of turtle nesting sites, important though those are.

Once these have been identified, land purchasing, education, lobbying, monitoring and, if necessary, direct action, can be targeted accordingly. The current tools used for CZM analysis such as GIS are not inappropriate, they are just not being used to answer the right questions.

In the light of these research findings above, it is proposed that, at the very least, the IUCN's Guidelines for Preparing a Coastal Zone Management Plan for Belize need to be modified. They need to include stakeholder analysis which, as a priority, identifies the elite stakeholders and their interests and networks. In light of these, activities to promote sustainable development can be designed to circumvent their vested interests or engage them.

Time intervention to catch the right point in the decision-making process: This research has shown that decisions are made far in advance of the key players coming into power. The next election in Belize is being held in July 1998 and most observers suggest that the PUP are going to win. At the present time (January 1998), decisions are already being made by the PUP executive about development priorities, and many of these are being influenced by contributions being made to campaign funds by developers. Environmentalists need to pay more attention to the timing of their interventions, so that they come at such times when decisions are being taken. Trying to impose policies and land use decisions after this point is more likely to meet with failure. The ODA should therefore fund an immediate mission to secure commitments from the PUP executive about natural resource use.

Buy 'a place at the table': Following on from this, the most radical recommendation is that environmentalists, through a suitable Belizean individual or NGO, should now be engaged in this bartering process. They should make contributions to party funds to secure the commitment necessary to ensure the sustainable use of critical resources. For example, payment would be made to ensure that government housing projects do leave mangrove buffers, or that no more leases are given out in a certain area. This, essentially, provides *political compensation* for the new ruling elite to off-set against the loss of patronage resources. It engages these people when they are at their most needy, leaverage is greatest and therefore achieves best 'value for money' in securing environmental aims.

Pessimistic or realistic? These are the main recommendations arising out of nine years of research and involvement in mangrove management in Belize. Realistically, only the less controversial are expected to be acceptable. The result will be continued deterioration of mangrove habitat in Belize, even in this country that had greater opportunities for sustainable development than perhaps any other developing country.

At some point in the future, the situation will become so severe that the impoverishment of Belize's coastal resources will adversely affect its business community. Then sufficient political momentum will then be generated to have remedial measures instigated. Almost certainly, this will not be able to fully regenerate the productivity or biodiversity that will have been lost.

If Belize City or the San Pedro area are hit by a sufficiently severe hurricane, development may be curtailed and decision makers be more receptive to the tenets of sustainable development. However, their mentality is such that their response to this 'act of nature' will be to see it as a challenge to rebuild these communities. Only a second immediate hurricane is likely to diminish this fervour sufficiently that sustainable development measures are actually adopted.

Sustainable development is a highly ideological construct that contains important social, economic and political consequences. It is clear that its environmental goals conflict with the profit-maximisation rationale inherent in capitalist ideology and also interfere with the socio-political relations on which the ruling elite depend for their power. Since, by definition, elites yield a superior degree of power over resource use, they, in combination with the profit-maximising development nexus will combine to suppress the implementation of sustainable resource use.

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Belize Today

The Government of Belize Gazette

Names and Positions of Principal Informants — Appendix 1

The posts of the individuals who provided information are listed below. Names are excluded to preserve a basic level of anonymity.

Long-term Contacts (i.e. contact maintained for longer than three months)

Principal Lands Officer, Land and Surveys Department, Ministry of Natural Resources, Belize District

Principal Forest Officer (promoted to Chief Forest Officer), Forest Department, Belmopan

Permanent Secretary, Ministry of Natural Resources, Belmopan

Forest Management Consultant, Forest Planning and Management Project, Belmopan (contracted from Natural Resources Institute, Chatham)

Chief Environment Officer, Department of Environment, Ministry of Tourism and Environment, Belmopan

Co-ordinator, Coastal Zone Management Unit, Fisheries Department, Ministry of Agriculture and Fisheries, and Wildlife Conservation International, Belize City

Commissioner of Land and Surveys, Land and Surveys Department, Ministry of Natural Resources, Belmopan

Fisheries Administrator, Fisheries Department, Ministry of Agriculture and Fisheries, Belize City

Social Planning Consultant, Forest Planning and Management Project, Belmopan

Office of the Director, Environment Department, World Bank.

Chief Forest Officer, Forest Department, Ministry of Natural Resources, Belmopan

Mangrove Manager, Forest Department, Ministry of Natural Resources, Belmopan

Forest Ranger, Forest Department, Ministry of Natural Resources, Belmopan

Consultant Agronomist, Belmopan, (contracted to the ODA Belize Resource Assessment team, 1991)

Tropical Forestry Action Plan Co-ordinator, Forest Department, Ministry of Natural Resources, Belmopan

Team Leader and Land Use Consultant, Forest Planning and Management Project, Belmopan (contracted from Natural Resources Institute, Chatham)

Conservation Officer, Forest Department, Ministry of Natural Resources, Belmopan

Director, Belize Zoo and Tropical Education Centre, Mile 42, Western Highway, Belize District

Physical Planner, Land and Surveys Department, Ministry of Natural Resources, Belmopan (also Physical Planner, Forest Planning and Management Project)

Vice President, Belize Audubon Society, Belize City

Consultant to Programme for Belize, Belize City

Principal Fisheries Officer, Fisheries Department, Ministry of Agriculture and Fisheries, Belize City

Director, Belize Centre for Environmental Studies, Belize City

Director, Belize Resort and Development co. Ltd., Belize City

Forest Ranger, Forest Department, Ministry of Natural Resources, Belmopan

Principal Forest Officer, Forest Department, Ministry of Natural Resources, Belmopan

Conservation Specialist, Programme for Belize, Belize City

Consultant Soil Scientist and Ecologist, Toledo District

Coastal Zone Management Unit, Fisheries Department, Belize City

Office Administrator, Forest Planning and Management Project, Belmopan

Short Contacts (i.e. contact maintained for less than three months)

Business Development Consultant, Belmopan (former Third Secretary (Aid), at the British High Commission in Belize)

Land Use Planner, Land and Surveys Department, Ministry of Natural Resources, Belmopan

New York Zoological Society Central America Programme Officer

Assistant Director, Bella Vista Development Co. Ltd., Belize City

WWF Programme Officer for Central America, Washington D.C.

Principal Lands Officer, Land and Surveys Department, Ministry of Natural Resources, Belmopan

Director of Community Conservation Consultants and founder of the Bermudian Landing Community Baboon Sanctuary, Belize District

Former Minister for Natural Resources for the People's United Party (Representative for Fort George), Belize City

Former Permanent Secretary and Lands Commissioner, Ministry of Natural Resources, Belmopan (also Belize Ambassador to the USA)

Real Estate Broker, Belize City

Real Estate Broker, Belize Real Estate Ltd., Belize City

Manager, Blackbird Caye Resort and PUP activist, Belize City

Town Planner, Voluntary Services Overseas, Belmopan

Social Policy Adviser, Ministry of Economic Development

Director, Coral Caye Conservation Ltd., London

Former Chief Forest Officer, Forest Department, Ministry of Natural Resources, Belmopan

Secretary, Belize Audubon Society, Belize City

Founder member, Belize Audubon Society, Parrot Hill Farm, Belize District.

Consultant Land Use Planned and Property Developer, Consejo Shores, Corozal District

People's United Party nominee for Toledo South and Former Lands Officer, Ministry of Natural Resources, Belmopan

United Democratic Party Representative for Port Loyola, Belize City (now Minister for Tourism and Environment)

NB. An interview was obtained with the Attorney and former PUP Minister of Tourism and Environment, but he was not prepared to provide any information.

Freedom House Methodolgy and Data Appendix 2

This description is taken from the Freedom House web site http://www.freedomhouse.org.

The Comparative Survey of Freedom 1995-1996: Survey Methodology

The purpose of the Comparative Survey of Freedom since its inception in the 1970s has been to provide an annual evaluation of political rights and civil liberties everywhere in the world.

The Survey attempts to judge all places by a single standard and to point out the importance of democracy and freedom. At a minimum, a democracy is a political system in which the people choose their authoritative leaders freely from among competing groups and individuals who were not chosen by the government. Putting it broadly, freedom is the chance to act spontaneously in a variety of fields outside the control of government and other centers of potential domination. For a long time, Westerners have associated the adherence to political rights and civil liberties with the liberal democracies, such as those in North America and the European Union. However, there has been a proliferation of democracies in developing countries in recent years, and the Survey reflects their growing numbers. Freedom House does not view democracy as a static concept, and the Survey recognizes that a democratic country does not necessarily belong in our category of "free" states. A democracy can lose freedom and become merely "partly free." Sri Lanka and Colombia are examples of such "partly free" democracies. In other cases, countries that replaced military regimes with elected governments can have less than complete transitions to liberal democracy. El Salvador and Guatemala fit the description of this kind of "partly free" democracy. (See the section below on the designations "free," "partly free," and "not free" for an explanation of those terms.) Readers should note that some scholars would use the term "semi-democracy" or "formal democracy," instead of "partly free" democracy, to refer to countries that are democratic in form but less than free in substance.

Definitions and Categories of the Survey

The Survey's understanding of freedom is broad and encompasses two sets of characteristics grouped under political rights and civil liberties. Political rights enable people to participate freely in the political process. By the political process, we mean the system by which the polity chooses the authoritative policy makers and attempts to make binding decisions affecting the national, regional or local community. In a free society this means the right of all adults to vote and compete for public office, and for elected representatives to have a decisive vote on public policies. A system is genuinely free or democratic to the extent that the people have a choice in determining the nature of the system and its leaders.

Civil liberties are the freedoms to develop views, institutions and personal autonomy apart from the state.

The Survey employs checklists for these rights and liberties to help determine the degree of freedom present in each country and related territory, and to help assign each entity to a comparative category.

Political Rights checklist

1. Is the head of state and/or head of government or other chief authority elected through free and fair elections?

2. Are the legislative representatives elected through free and fair elections?

3. Are there fair electoral laws, equal campaigning opportunities, fair polling and honest tabulation of ballots?

4. Are the voters able to endow their freely elected representatives with real power?

5. Do the people have the right to organize in different political parties or other competitive political groupings of their
choice, and is the system open to the rise and fall of these competing parties or groupings?

6. Is there a significant opposition vote, de facto opposition power, and a realistic possibility for the opposition to increase
its support or gain power through elections?

7. Are the people free from domination by the military, foreign powers, totalitarian parties, religious hierarchies, economic
oligarchies or any other powerful group?

8. Do cultural, ethnic, religious and other minority groups have reasonable self-determination, self-government, autonomy or
participation through informal consensus in the decision-making process?

Additional Discretionary Political Rights Questions

A. For traditional monarchies that have no parties or electoral process, does the system provide for consultation with the people, encourage discussion of policy, and allow the right to petition the ruler?

B. Is the government or occupying power deliberately changing the ethnic composition of a country or territory so as to destroy a culture or tip the political balance in favor of another group?

When answering the political rights questions, Freedom House considers the extent to which the system offers the voter the chance to make a free choice among competing candidates, and to what extent the candidates are chosen independently of the state. We recognize that formal electoral procedures are not the only factors that determine the real distribution of power. In many Latin American countries, for example, the military retains a significant political role. The more people suffer under such domination by unelected forces, the less chance the country has of getting credit for self-determination in our Survey.

Freedom House does not have a culture-bound view of democracy. The Survey team rejects the notion that only Europeans and those of European descent qualify as democratic. The Survey demonstrates that, in addition to those in Europe and the Americas, there are free countries with varying kinds of democracy functioning among people of all races and religions in Africa, the Pacific and Asia. In some Pacific islands, free countries can have

competitive political systems based on competing family groups and personalities rather than on European- or American-style parties.

Civil Liberties checklist

1. Are there free and independent media, literature and other cultural expressions? (Note: In cases where the media are state-controlled but offer pluralistic points of view, the Survey gives the system credit.)

2. Is there open public discussion and free private discussion?

3. Is there freedom of assembly and demonstration?

4. Is there freedom of political or quasi-political organization? (Note: This includes political parties, civic associations, *ad hoc* issue groups and so forth.)

5. Are citizens equal under the law, with access to an independent, nondiscriminatory judiciary, and are they respected by the security forces?

6. Is there protection from political terror, and from unjustified imprisonment, exile or torture, whether by groups that support or oppose the system, and freedom from war or insurgency situations? (Note: Freedom from war and insurgency situations enhances the liberties in a free society, but the absence of wars and insurgencies does not in itself make an unfree society free.)

7. Are there free trade unions and peasant organizations or equivalents, and is there effective collective bargaining?

8. Are there free professional and other private organizations?

9. Are there free businesses or cooperatives?

10. Are there free religious institutions and free private and public religious expressions?

11. Are there personal social freedoms, which include such aspects as gender equality, property rights, freedom of movement, choice of residence, and choice of marriage and size of family?

12. Is there equality of opportunity, which includes freedom from exploitation by or dependency on landlords, employers, union leaders, bureaucrats or any other type of denigrating obstacle to a share of legitimate economic gains?

13. Is there freedom from extreme government indifference and corruption?

When analyzing the civil liberties checklist, Freedom House does not mistake constitutional guarantees of human rights for those rights in practice. For tiny island countries and territories and other small entities with low populations, the absence of unions and other types of association does not necessarily count as a negative unless the government or other centers of domination are deliberately blocking association. In some cases, the small size of these entities may result in a lack of sufficient institutional complexity to make them fully comparable to larger countries. The question of equality of opportunity also implies a free

choice of employment and education. Extreme inequality of opportunity prevents disadvantaged individuals from enjoying a full exercise of civil liberties. Typically, desperately poor countries and territories lack both opportunities for economic advancement and the other liberties on this checklist. We have a question on gross indifference and corruption, because when governments do not care about the social and economic welfare of large sectors of the population, the human rights of those people suffer. Government corruption can pervert the political process and hamper the development of a free economy.

How Do We Grade? Ratings, Categories and Raw Points

The Survey rates political rights and civil liberties separately on a seven-category scale, 1 representing the most free and 7 the least free. A country is assigned to a particular category based on responses to the checklist and the judgments of the Survey team at Freedom House. The numbers are not purely mechanical; they also reflect judgment. Under the methodology, the team assigns initial ratings to countries by awarding from 0 to 4 raw points per checklist item, depending on the comparative rights or liberties present. (In the Surveys completed from 1989-90 through 1992-93, the methodology allowed for a less nuanced range of 0 to 2 raw points per question. Taking note of this modification, scholars should consider the 1993-94 scores the statistical benchmark.) The only exception to the addition of 0 to 4 raw points per checklist item is the discretionary question on cultural destruction and deliberate demographic change to tip the political balance. In that case, we subtract 1 to 4 raw points depending on the situation's severity. The highest possible score for political rights is 32 points, based on up to 4 points for each of eight questions. The highest possible score for civil liberties is 52 points, based on up to 4 points for each of thirteen questions. Under the methodology, raw points correspond to category numbers as follows:

Political Rights	**Civil Liberties**
Category Number/Raw points	**Category Number/Raw points**
1 28-32	1 45-52
2 23-27	2 38-44
3 19-22	3 30-37
4 14-18	4 23-29
5 10-13	5 15-22
6 5-9	6 8-14
7 0-4	7 0-7

After placing countries in initial categories based on checklist points, the Survey team makes minor adjustments to account for factors such as extreme violence, whose intensity may not be reflected in answering the checklist questions. These exceptions aside, in the overwhelming number of cases, the checklist system reflects the real world situation and is adequate for placing countries and territories into the proper comparative categories.

At its discretion, Freedom House assigns up or down arrows to countries and territories to indicate positive or negative trends, whether qualitative or quantitative, that may not be apparent from the ratings. Such trends may or may not be reflected in raw points, depending on the circumstances of each country or territory. Only places without ratings changes since the previous year warrant trend arrows. The charts on pages 536-538 also show up and down triangles. Distinct from the trend arrows, the triangles indicate changes in political rights and civil liberties caused by real world events since the last Survey.

Free, Partly Free, Not Free

The Survey places countries and territories into this tripartite division by averaging the category numbers they received for political rights and civil liberties. Those whose category numbers average 1-2.5 are considered "free," 3-5.5 "partly free," and 5.5-7 "not free." The dividing line between "partly free" and "not free" falls within the group whose category numbers average 5.5. For example, countries that receive a rating of 6 for political rights and 5 for civil liberties, or a 5 for political rights and a 6 for civil liberties, could be either "partly free" or "not free." The total number of raw points is the factor which makes the difference between the two. Countries and territories with combined raw scores of 0-28 points are "not free," and those with combined raw scores of 29-56 points are "partly free." "Free" countries and territories have combined raw scores of 57-84 points.

The differences in raw points between countries in the three broad categories represent distinctions in the real world. There are obstacles which "partly free" countries must overcome before they can be called "free," just as there are impediments which prevent "not free" countries from being called "partly free." Countries at the lowest rung of the "free" category (category 2 in political rights with category 3 in civil liberties or category 3 in political rights with category 2 in civil liberties) differ from those at the upper end of the "partly free" group (e.g., category 3 in both). Typically, there is more violence and/or military influence on politics at 3,3 than at 2,3 and the differences become more striking as one compares 2,3 with worse categories of the "partly free" countries.

The distinction between the least bad "not free" countries and the least free "partly free" may be less obvious than the gap between "partly free" and "free," but at "partly free" there is at least one extra factor that keeps a country from being assigned to the "not free" category. For example, Lebanon, which was rated 6,5 both last year and this year, but which was "partly free" last year, became "not free" this year after its legislature unilaterally extended the incumbent president's term indefinitely. Though not sufficient to drop the country's political rights rating to category 7, there was enough of a drop in raw points to change its category.

Freedom House wishes to point out that the designation "free" does not mean that a country has perfect freedom or lacks serious problems. As an institution that advocates human rights, Freedom House remains concerned about a variety of social problems and civil liberties questions in the U.S. and other countries that the Survey places in the "free" category. Similarly, in no way does an improvement in a country's rating mean that human rights campaigns should cease. On the contrary, we wish to use the Survey as a prod to improve the condition of all countries.

Readers should understand that the "free," "partly free," and "not free" labels are highly simplified terms that each cover a broad third of the available raw points. The labels do not imply that all countries in a category are the same any more than a bestseller list implies that all titles on it have sold the same number of books. Countries and territories can reach the same categories or even raw points by differing routes. We use the tripartite labels and tricolor maps to illustrate some broad comparisons. In theory, we could have eighty-five categories and colors to match the range of raw points, but this would be highly impractical.

The Approach of the Survey

The Survey attempts to measure conditions as they really are around the world. This approach is distinct from relying on intense coverage by the American media as a guide to which countries are the least free. The publicity given problems in some countries does not necessarily mean that unpublicized problems of other countries are not more severe. For example, while U.S. television networks are allowed into Israel and El Salvador to cover abuses of human rights, they are not allowed to report freely in North Korea, which has far less freedom than the other two countries. To reach such comparative conclusions, Freedom House evaluates the development of democratic governmental institutions, or lack thereof, and also examines the quality of civil society, life outside the state structure.

Without a well-developed civil society, it is difficult, if not impossible, to have an atmosphere supportive of democracy. A society that does not have free individual and group expressions in nonpolitical matters is not likely to make an exception for political ones. As though to prove this, there is no country in the Survey that places in category 6 or 7 for civil liberties and, at the same time, in category 1 or 2 for political rights. Almost without exception in the Survey, countries and territories have ratings in political rights and civil liberties that are within two categories of each other.

The Survey rates both countries and related territories. For our purposes, countries are internationally recognized independent states whose governments are resident within their officially claimed territories. The Survey excludes uninhabited related territories and such entities as the U.S.-owned Johnston Atoll, which has only a transient military population and no native inhabitants. Since most related territories have a broad range of civil liberties and some form of self-government, a higher proportion of them have the "free" designation than do independent countries.

Mangrove Country	Area (ha)	Freedom	PR	CL
American Samoa	N/A	2	1	1
Angola	1700	12	6	6
Anguilla	517	3	2	1
Antigua & Barbuda	1316	7	4	3
Aruba	420	3	2	1
Australia	1150000	2	1	1
Bahamas	233200	3	1	2
Bahrain	100	13	7	6
Bangladesh	576700	6	2	4
Barbados	7	2	1	1
Belize	76924	2	1	1
Benin	125000	4	2	2
Bermuda	10	2	1	1
Brazil	1340000	6	2	4
British Indian Ocean Terr.	N/A	2	1	1
Brunei	17100	12	7	5
Cambodia	85100	12	6	6
Cameroon	249400	12	7	5
Cayman Islands	7100	2	1	1
China	36600	14	7	7
Columbia	365900	8	4	4
Comoros Islands	2600	8	4	4
Congo	12000	8	4	4
Costa Rica	37000	3	1	2
Cuba	784800	14	7	7
Djibouti	1000	11	5	6
Dominica	156	2	1	1
Dominican Rep.	32500	6	3	3
Ecuador	246900	6	2	4
Egypt	86100	12	6	6
El Salvador	26800	6	3	3
Equatorial Guinea	27700	14	7	7
Eritrea	58100	10	6	4
Fiji	38500	7	4	3
French Guiana	5500	3	1	2
French Polynesia	N/A	3	1	2
Gabon	250000	9	5	4
Gambia, The	49700	13	7	6
Ghana	10000	7	3	4
Grenada	235	3	1	2
Guam	94	2	1	1
Guatemala	16100	7	3	4
Guinea	296300	11	6	5
Guinea Bissau	248400	7	3	4
Guyana	80000	4	2	2
Haiti	13400	9	4	5
Honduras	145800	6	3	3
India	670000	6	2	4
Indonesia	4255000	12	7	5
Iran	20700	13	6	7

Mangrove Country	Area (ha)	Freedom	PR	CL
Ivory Coast	64400	11	6	5
Jamaica	10600	5	2	3
Japan	450	3	1	2
Kenya	53000	13	7	6
Kiribati	N/A	2	1	1
Liberia	19000	13	7	6
Macau	1	10	6	4
Madagascar	340300	6	2	4
Malaysia	642400	9	4	5
Maldives	N/A	12	6	6
Marshall Islands	N/A	2	1	1
Martinique	1587	3	1	2
Mauritania	104	12	6	6
Mauritius	N/A	3	1	2
Mayotte	1000	3	1	2
Mexico	531500	7	4	3
Micronesia, Fed. States of	8600	2	1	1
Montserrat	2	2	1	1
Mozambique	92500	7	3	4
Myanmar	378600	14	7	7
Nauru	N/A	4	1	3
Netherland Antilles	87	3	1	2
New Caledonia	45600	5	3	2
New Zealand	28700	2	1	1
Nicaragua	171800	6	3	3
Nigeria	1051500	13	7	6
Northern Mariana Islands	N/A	3	1	2
Oman	2000	12	6	6
Pakistan	168300	9	4	5
Palau	N/A	3	1	2
Panama	181400	5	2	3
Peru	5100	7	4	3
Philippines	160700	5	2	3
PNG	539900	6	2	4
Puerto Rico	9200	3	1	2
Qatar	500	13	7	6
Saint Chris.-Nevis (St. Kitts)	71	3	1	2
Saint Lucia	125	3	1	2
Saint Vincent and Grenadines	45	3	2	1
Saudi Arabia	29200	14	7	7
Senegal	185300	8	4	4
Seychelles	2900	6	3	3
Sierra Leone	183800	9	4	5
Singapore	600	9	4	5
Solomon Islands	64200	3	1	2
Somalia	91000	14	7	7
South Africa	1100	3	1	2
Sri Lanka	8900	8	3	5
Sudan	93700	14	7	7
Surinam	115000	6	3	3
Tanzania	115500	10	5	5

Mangrove Country	Area (ha)	Freedom	PR	CL
Thailand	264100	6	3	3
Togo	2600	11	6	5
Tonga	1000	8	5	3
Trinidad & Tobago	7000	3	1	2
Turks & Caicos Islands	11100	2	1	1
Tuvalu	N/A	2	1	1
United Arab Em.	3000	11	6	5
USA	199000	2	1	1
Vanuatu	1600	4	1	3
Venezuela	250000	5	2	3
Viet Nam	252500	14	7	7
Virgin Islands (UK)	435	2	1	1
Virgin Islands (USA)	978	2	1	1
Wallace & Futuna Islands	N/A	4	2	2
Western Samoa	700	4	2	2
Yemen, Rep.	8100	11	5	6
Zaire	22600	13	7	6

CL = Civil Liberty PR = Political Rights
Source for mangrove extent is Spalding *et al.* 1997

Field Data on the Structural and Species Characteristics of Selected Mangrove Sub-community in Belize

Appendix 3

Point-Centred Quarter Results for Basin Mixed Mangrove Forest

Species	n	ba (m^2/ha)	Rel. dens.	Rel. dom.	Rel. freq.	IVI
BAR RIVER, BELIZE DISTRICT						
20 points, 8m apart. Qualifying size 10cm dbh.						
Closed stand of Ag and Lr in the 13-16m height range, with some smaller Rm not of sufficient size to reach the qualifying diameter. ***Basin mixed mangrove forest.***						
A. germinans	39	9.0	49	57	50	156
R. mangle	40	6.6	50	42	47	139
L. racemosa	1	0.2	1	6	3	10
Total Basal Area		**15.8**	**Absolute Density = 780 trees/ha**			
BAR RIVER, BELIZE DISTRICT						
20 points, 8m apart. Qualifying size 10cm dbh.						
Closed stand of Ag, Lr and Rm. The first 2 species are in the 16-19m height range, and Rm between 10-11m. Very few saplings or seedlings present, but dense carpet of pneumatophores to approx. 0.3m. ***Basin mixed mangrove forest.***						
A. germinans	45	15.05	56.2	78.5	44.2	178.9
R. mangle	23	2.09	28.7	10.8	37.2	76.7
L. racemosa	12	2.08	15.0	10.77	18.6	44.8
Total Basal Area		**19.3**	**Absolute Density = 738.5 trees/ha**			
BAR RIVER, BELIZE DISTRICT						
10 points, 8m apart. Qualifying size 10cm dbh.						
Closed stand of Rm (including many multi-trunked individuals), ranging from 13-16m high, mixed with a smaller number of Lr. Seedlings are scarce and saplings rare. ***Transition between basin mixed forest to riverine Rm forest.***						
A. germinans	absent	absent	absent	absent	absent	absent
R. mangle	28	17.0	70.0	73.0	64.3	207.3
L. racemosa	12	6.3	30.0	27.0	35.7	92.7
Total Basal Area		**23.3**	**Absolute Density = 1160 trees/ha**			
QUASHIE TRAP LAGOON, BELIZE DISTRICT						
10 points, 8m apart. Qualifying size 5cm dbh.						
Closed stand of Ag of average height of 8m, mixed with a scattered smaller number of Rm (none above qualifying size) and Lr. There are a fair number of seedlings are saplings present (principally of Ag), a dense cover of pneumatophores (to 0.3m) with no other ground flora. The area is inundated to a depth of 0.1m. ***Basin mixed forest.***						
A. germinans	38	13.0	95	98.5	83	276.5
R. mangle	absent	absent	absent	absent	absent	absent
L. racemosa	2	0.2	5	1.5	17	23.5
Total Basal Area		**13.2**	**Absolute Density = 1531 trees/ha**			

Point-Centred Quarter Results for Basin Mixed Mangrove Forest (contd.)

SITTEE RIVER MOUTH, STANN CREEK DISTRICT						
20 points, 15m apart. Qualifying size 10cm dbh.						
Closed stand of mixed mangrove. Some Ag and Lr attain heights in excess of 20m while Rm frequently reach 16m. There are signs of re-growth after hurricane damage (from 1966), specifically branches emerging from snapped off trunks. There are very few young trees. ***Basin mixed forest.***						
A. germinans	31	21.6	38.7	68.6	80	187.3
R. mangle	37	5.8	46.2	18.4	80	144.6
L. racemosa	12	4.1	15.0	13.0	50	78.0
Total Basal Area		**31.5**	**Absolute Density = 667.5 trees/ha**			
BARRANCO, TOLEDO DISTRICT						
10 points, 10m apart. Qualifying size 10cm dbh.						
Closed stand of Rm and Lr up to 25m height. Understorey of sparse Rm and Lr seedlings, and a few scattered ferns and sedges. In addition, this forest supported numerous epiphytic ferns, bromeliads and orchids. Standing water present to 0.25m deep. ***Transition from basin mixed mangrove forest to fringing Rm forest.***						
Species	**n**	**ba (m^2/ha)**	**Rel. dens.**	**Rel. dom.**	**Rel. freq.**	**IVI**
A. germinans	absent	absent	absent	absent	absent	absent
R. mangle	37	21.6	92	97	83	272
L. racemosa	3	0.7	8	3	17	28
Total Basal Area		**22.3**	**Absolute Density = 520 trees/ha**			

Quadrat Results for Basin Mangrove Scrub

QUASHIE TRAP LAGOON, BELIZE DISTRICT						
5 x 5m quadrat. Qualifying diameter 1cm 0.3m above ground level.						
Open scrub of 0.7-3.5m, primarily composed of Ag, with occasional LR. Ground cover is standing water with some Ag seedlings, sedges, grasses and Batis maritima. ***Basin Ag scrub.***						
Species	**n**	**ba (m^2/ha)**	**Rel. dens.**	**Rel. dom.**	**Rel. freq.**	**CVI**
A. germinans	25	3.98	86.2	78.5	n/a	176.6
R. mangle	absent	absent	absent	absent	n/a	absent
L. racemosa	4	0.42	13.8	9.5	n/a	23.3
Total Basal Area		**4.40**	**Absolute Density = 11,600 trees/ha**			
QUASHIE TRAP LAGOON, BELIZE DISTRICT						
5 x 5m quadrat. Qualifying diameter 1cm 0.3m above ground level.						
Open scrub primarily composed of Ag, with occasional LR, in the same approx. height range, but with a greater proportion of plants slightly taller, around 2.0-2.5m. Ground cover is standing water with some Ag seedlings, sedges, grasses and Batis maritima. ***Basin Ag scrub.***						
A. germinans	30	7.3	50	75.6	n/a	125.6
R. mangle	absent	absent	absent	absent	n/a	absent
L. racemosa	30	7.25	50	24.3	n/a	74.3
Total Basal Area		**9.65**	**Absolute Density = 24,000 trees/ha**			

CVI (Cover Value Index) = Rel. density + Rel. dominance

Classification of Belizean Mangrove Sub-communities

Appendix 4

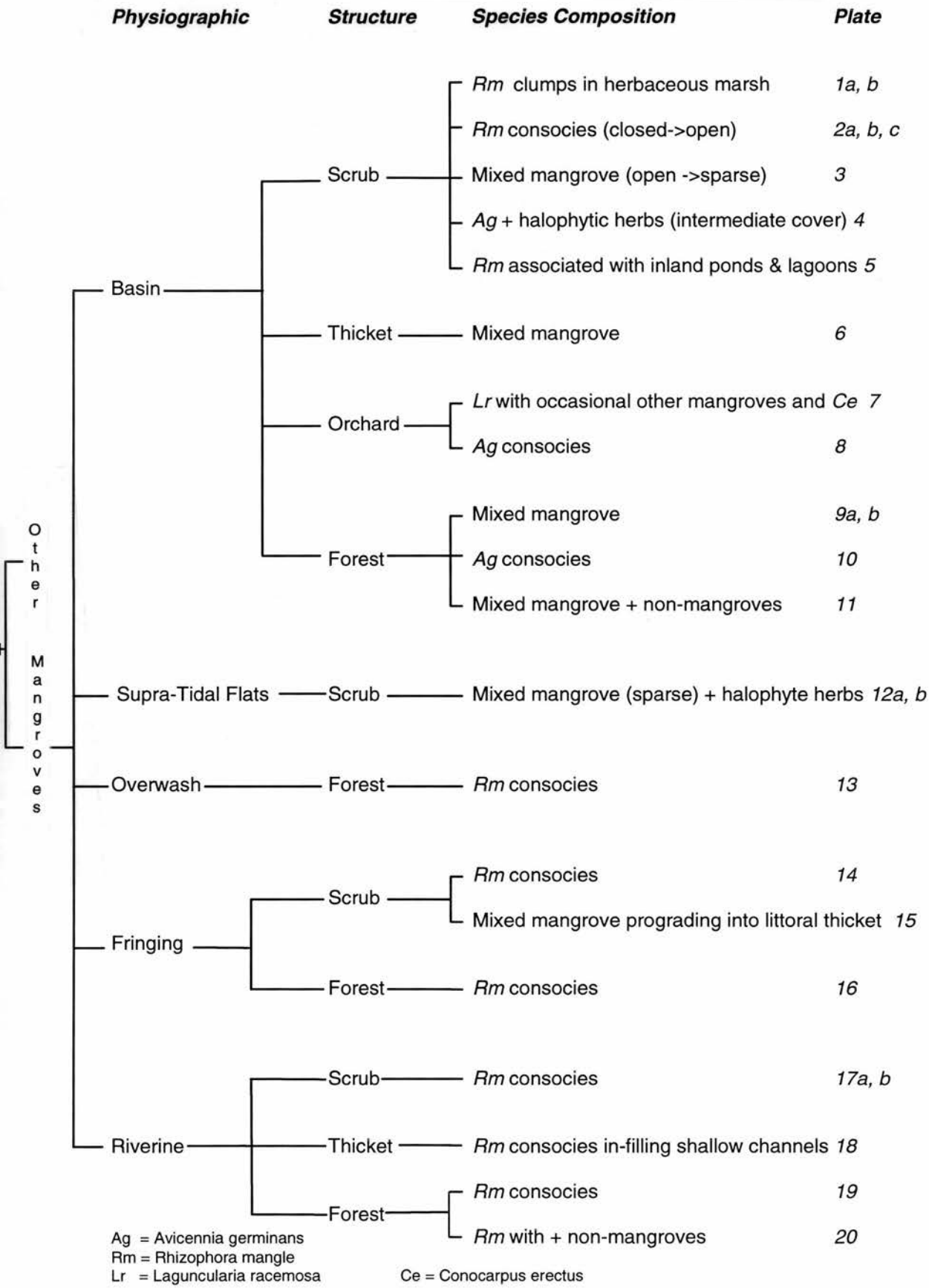
1.1 Introduction

This hierarchical classification has its first level divided on the basis of physiography, its second on vegetation structure and its third on species composition. Like all classifications of this sort, gradations exist which fall across categories, but extensive fieldwork suggests the system devised covers all principal sub-communities encountered in a logical and systematic way. The physiographic divisions are after Lugo and Snedaker (1974), and structural categories follow the UNESCO-adopted protocol of Mueller-Dombois and Ellenberg (1974). Accordingly, forests are defined as communities dominated by single-trunked trees at least 5m tall with their crowns touching or abutting and covering at least 30% of the land surface area. Open forests, referred to here as 'orchards' are those where tree crowns do not generally touch. Scrub communities are dominated by woody species which are generally multi-trunked and lower than 5m tall, and whose crowns cover at least 30% of the surface area. Thickets are denser scrubs in which the crowns generally are in contact. In the case of Belize, Jenkin *et al.* (1976) give a further useful and generally concurrent definition of this category. They classify thickets as dense woody vegetation of small trees and shrubs, frequently multi-stemmed, and varying in height from about 3.7m to 9.1m, with herbaceous ground cover rather sparse or absent, and (except in the case of secondary thickets), associated with impeded drainage and seasonal extremes of soil moisture. Also adopted here is their definition of savannas, as communities of continuous herbaceous ground cover of grass and/or sedges, with or without admixtures of trees and/or shrubs scattered singly or in discrete clumps, usually associated with impede drainage, seasonal soil moisture extremes and frequent fires.

1.2 Mangrove Sub-Community Types Occurring in Belize

Variations in the physical characteristics of Belize's coastal zone interact with the different tolerances of the three mangrove species and their associates to form a distinct and wide range of mangrove sub-communities. In all, 20 have been identified, according to the hierarchical breakdown shown in Figure A1. Their details are described below. Plates showing examples of the sub-communities are provided at the end of the appendix.

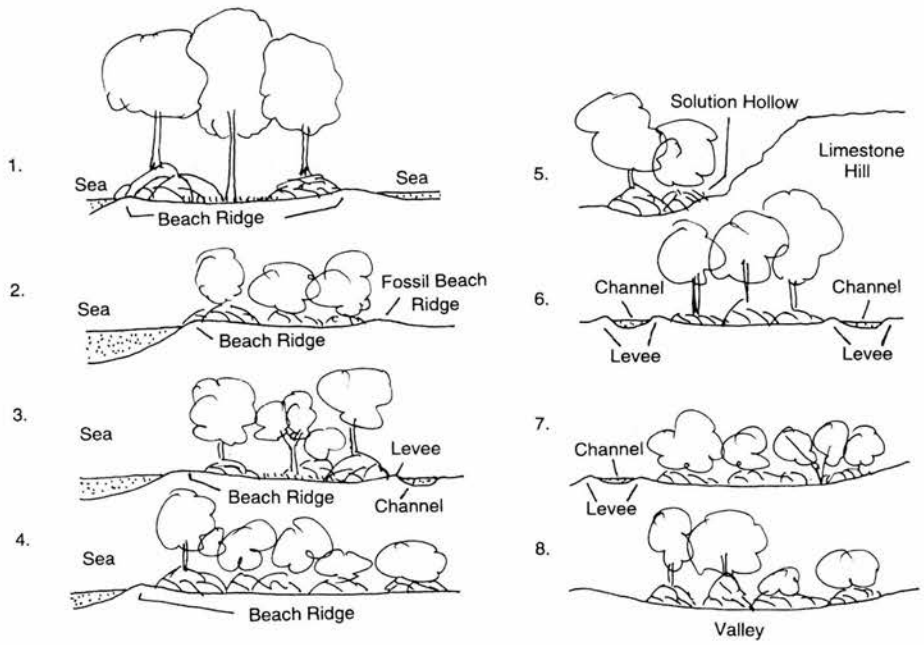
Figure A1 Classification of Belizean Mangrove Sub-Communities



BASIN MANGROVE

General Characteristics: Surface hydrology is often characterised by sluggish laminar water flows over wide areas of very small topographic gradients. The water turnover rate is slow, with basins receiving and storing water seasonally (Cintrôn and Schaeffer-Novelli 1982). Substrate consist primarily of mud, peat, marl or sandy loam (Furley and Munro 1993). Basin communities develop in a wide range of physiographic environments (Figure A2), and because of resulting variations in salinity, hydrology and nutrient availability the composition and structure of the sub-communities which develop is very varied, more so than with any other physiographic setting.

Figure A2 Topographic Depressions Associated With Basin Mangroves



Basin Scrubs

***R. mangle* Clumps in herbaceous marsh:** Red mangroves occurring in isolated clumps in brackish or freshwater marshes, seldom exceeding 3.1m high. Common herbaceous species occupying the areas between these mangrove 'islands' are *Cladium jamaicense* and *Eleocharis interstincta*, or *Fuirena* and *Mariscus* species in more brackish situations (Standley and Record

1936, Jenkin *et al.* 1976). The sub-community is found in broad marshy shallow drainage depressions which tend to dry out during drought years. Jenkin *et al.* (1976) include examples (categorised as brackish savannas) in the lower Belize River Valley, one being about 1.6 km north of the Western Highway, at 15.3 km from Belize City. Other examples are swamps south of the Western Highway at Almond Hill Lagoon and on the flood plain of the Rio Hondo. (Plate 1a and 1b).

***R. mangle* consocies (closed -> open):** The sub-community is found in basins prone to tidal flooding, or where permanent flooding by fresh or brackish water is deeper than 15cm (Lugo and Snedaker 1974). Coverage ranges from closed to extremely open vegetation, and trees range from approximately 0.5m to 3.5m in height. Extensive algal mats may exist in shallow water areas, and patches of sedge may occur also. This sub-community occurs in extensive expanses around the country, and it is the most widespread sub-community type. It may also include very occasional emergent black or white mangroves or buttonwood up to about 8m, an example being Hartley peninsula, Southern Lagoon. Examples of pure red mangrove scrub are more common however, and include the interior of Spanish Look Out Caye, and east of Boom Creek, south of Belize City. (Plate 2a, 2b and 2c).

Mixed mangrove (open -> closed): This sub-community comprises mixed mangrove species, with the exact composition dependant on salinity variation, nutrient inputs, and rates of water exchange. Environmental conditions are severe (widely varying salinity and low nutrient input in particular), producing a dwarf sub-community comprising all species. The extent of cover varies widely, and intervening expanses of open water may be present. A widespread thick algal mat is generally present where there is standing water. *Salicornia* species and *Distichlis spicata* form a herb layer on slightly higher ground. Extensive examples of this sub-community occur on Ambergris Caye, for instance the flats adjacent to San Pedro Lagoon. (Plate 3).

***A. germinans* + halophytic herbs (intermediate cover):** A dwarf black mangrove sub-community, with trees ranging from approximately 1-4m growing with a sparse ground cover of *Spartina* and other species (Ratter and Bridgewater 1993). It appears to be a relatively restricted sub-community type in comparison to the previous two, with sites identified flanking the eastern shore of Quashie Trap Lagoon, the leeward side of Blackbird Caye, Turneffe Atoll, and parts of Ambergris Caye. (Plate 4).

Mangroves associated with inland ponds and lagoons: Red mangrove consocies also occur inland (out of the coastal zone), around depressions not connected to the sea[1]. Peat subsidence, solution of limestone and sink holes create depressions which may be colonised by mangrove seeds transported during floods. Alternatively, water bodies may have been previously connected to the sea in geological time, but have since become isolated. This latter isolating mechanism may have lead to the presence of red mangrove consocies at Indian Church and Booth's River for example, the latter over 65 km inland (Ratter and Bridgewater 1993) (Plate 5).

Basin Thickets

Mixed mangrove: This category (identified by Jenkin *et al.* 1976) as Mangrove Swamp Thicket), consists of dense thickets of red and other mangroves, in permanent swamps of up to about 0.9m deep[2]. On slight rises, bullet tree (*Bucida buceras*) (seldom exceeding 7.6m and usually much lower), buttonwood, palmetto (*Acoelorraphe wrightii*) and various sedges occur where salinity is low. Where flooding is relatively deep, red mangrove dominates. Where flooding is less extreme but saline, the mixed mangrove sub-community is dominated by red and black mangroves. On dryer sites, black and white mangroves are dominant, with red mangroves present only as small stature understorey bushes. Good examples also occur between Miles 9-12 on the Western Highway, along the lower Sibun River, and on the fringe of Fabers Lagoon, Belize District. (Plate 6).

Basin Orchards

***L. racemosa* with occasional other mangrove species and *C. erectus*:** Medium height white mangrove 'orchards' with occasional black, red and buttonwood was a sub-community observed in swales between upper storm platforms, in the interior of northern Caye Caulker. Most trees were multi-stemmed, approximately 2.5 to 7m tall, well spaced but forming a near-closed canopy. Shrubs were absent as was ground cover other than for dense clusters of white mangrove seedlings (to approximately 20cm). Shallow standing water was present (occupying about 30% by visual estimate). (Plate 7).

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[1] This sub-community was differentiated from others of comparable composition and structure because its different physiographic setting makes its functional attributes different, an important consideration for management.

[2] Jenkin *et al.* emphasise the dominance of red mangrove, but acknowledge its apparent prevalence was due to an unrepresentative set of sample sites rather than any real dominance.

***A. germinans* consocies:** Widely spaced black mangroves, to approximately 7m in height. Ground cover is of dense pneumatophores with some leaf litter, and their is evidence of long-term shallow flooding. Underlying substrate is peat. The most extensive area of this sub-community identified is adjacent to Laguna de Boca Ciega, Ambergris Caye. (Plate 8).

Basin Forest

Mixed mangroves: This sub-community consists of mixed mangrove species, with the relative abundance of each determined by flooding, salinity and natural disturbance (particularly hurricanes). Where rainfall and humidity are high, many epiphytic fern, bromeliad, and orchid species occur in this sub-community (Ratter and Bridgewater 1993). Forest height reaches a maximum of approximately 25m, but is more frequently around 15-17m. Ground flora is sparse consisting primarily of ferns and scattered mangrove seedlings. The sub-community occurs in central and southern Belize, behind river levees, adjacent to river mouths, or in basins where intermittent tidal and freshwater flooding delivers large quantities of nutrient-rich sediment (Haulover Creek, Belize River, Sittee River and the Barranco area respectively). Black and white dominated forest was also found between Quashie Trap Lagoon and the coast, and in the Bar River area (Ratter and Bridgewater 1993). (Plate 9a and 9b).

***A. germinans* consocies:** In nutrient rich basin environments without regular flushing, a single species sub-community was identified. This tall black mangrove forest presently reaches a height of approximately 19m. Ground flora is absent except for black mangrove seedlings. Occurrences of this sub-community are to the south of Belize City until approximately Mile 4 1/2, and on a number of the larger cayes of Turneffe atoll. (Plate 10).

Mixed mangrove and non-mangroves: These sub-communities include substantial non-mangrove components, including bullet tree (up to approximately 10m) and other trees, as well as non-mangrove shrubs including palmetto, and ground flora consisting of seedlings, leaf litter and leather fern (*Acrostichum aureum*). The degree of flooding is variable, and ranges from a dry site identified at Hartley Point (Southern Lagoon), Belize District, to the wetter conditions of the Mother Point area, in Toledo. (Plate 11).

SUPRA-TIDAL FLATS MANGROVE

General Characteristics: These cover extensive areas in northern Belize, specifically on Ambergris Caye and around the shallow lagoon complexes between Little Rocky Point and Sarteneja. This coincides with a geomorphologically distinct coastal region, consisting of a plateau of shallow recent calcareous marl with mud, over Pleistocene limestone. It lies within the driest region of the mainland, and also lacks ingress of freshwater from major rivers. Consequently, these coastal flats are highly saline (Hartshorn 1984). High evapotranspiration and wind desiccation compound the physiological dryness of this environment. The mangrove sub-communities here are therefore sparse with low biomass and are only intermittently inundated, during rainstorms, extreme tides and/or storm surges.

The configuration of the coastline in this region is such that winds from the south and east raise flooding in and around the coastal lagoons (J. Meerman pers. comm. 1992).

Supra-tidal Scrubs

Mixed mangrove (sparse) + halophytic herbs: Differentiated from the basin dwarf mixed mangrove sub-community by environmental dryness, it is to an extent an upland version of the basin counterpart. Higher elevations produce hypersaline salinas and higher coverages of herbaceous species, particularly *Spartina*. All three mangrove species are present. They reach a maximum of only 3m but generally are between 0.5-1.5m. Mangroves occur as individuals or clusters with species zonation dependant mainly on the degree of inundation by tides and standing water. Interspersed between vegetation there may be extensive algal mats. The supra-tidal sub-community is extremely extensive in the north of Belize, including Ambergris Caye. Where salinity concentrations are prohibitive and the ground is too dry for halophytic algae, bare ground is widespread (salinas). (Plate 12a and 12b).

OVERWASH MANGROVE

General Characteristics: Overwash mangroves grow in permanently flooded conditions (ranging from water tables at or just below the surface, to where permanent flooding of up to approximately 20cm). Underlying soils are poorly developed/immature and almost exclusively peat. This sub-community is characteristic of hundreds of low-lying Belizean cayes.

Overwash Forest

***R. mangle* consocies:** Being completely inundated the sub-community is generally dominated by *Rhizophora mangle*. Ground cover comprises leaf litter and occasional mangrove seedlings. Drowned Cayes are Belize's most extensive overwash habitat, although extensive areas also occur on the cayes of Turneffe and Port Honduras. Bird nesting and rookery sites are relatively common on overwash mangroves, in which case nutrient enrichment from guano produces taller mangroves. The most notable occurrence of this is on Man O' War Caye. (Plate 13).

FRINGING MANGROVE

General Characteristics: These develop in conditions of permanent flooding, along Belize's protected shores, adjacent to the sea or lagoons, and circumscribing large islands. In all cases *R. mangle* is the dominant species, decreasing and/or replaced to the landward by black and white mangroves in zones parallel to the shore. With the limited tidal range of the Caribbean, fringing mangroves occur in relatively narrow belts (although obviously depending on topography), with observations revealing fringes in the range of roughly 2m wide around lagoons and windward steeper shores, to approximately 60m wide on prograding or leeward shores with shallow gradients. Vegetation landward of fringing mangroves varies according to local topography. Examples include pine savanna, freshwater herbaceous swamp, littoral and dry forests, and various basin mangrove sub-communities.

Fringing Scrubs

***R. mangle* consocies:** Where isolated from allochthonous nutrient supply, the growth of fringe mangroves is restricted, and dwarf stands of red mangrove fringe result, limited to approximately 1-2m in height. Fringes in more nutrient rich environments have been observed up to approximately 6m. The sub-community is extremely widespread in northern Belize and the cayes. (Plate 14).

***R. mangle* prograding into littoral thicket:** This is an extremely common but very narrow sub-community lining the shores of sandy cayes, beach berms and lagoon banks. Red mangroves (1.5 to 4m) generally dominate the narrow fringe, with occasional black or white mangrove emergent behind. Ground flora consists generally of sparse *Spartina maritima*, *Distichlis spicata*, *Fimbristylis* or the sedge *Rhynchospora*. Shrubs may include buttonwood, cocoa plum (*Chrysobalanus icaco*) and sea grape (*Coccoloba uvifera*). (Plate 15).

Fringing Forest

***R. mangle* consocies:** Red mangrove consocies, generally occurring in narrow belts of less than 5m wide, seaward of the berms along beaches and lagoon banks. (Plate 16).

RIVERINE MANGROVE FOREST

General Characteristics: These are generally but not always, productive nutrient rich environments which receive a substantial input of nutrients from the watersheds of the rivers along which they grow. The sub-community ranges from approximately 1.5m to a maximum recorded to date of approximately 30m along sections of the Temash River (Ratter and Bridgewater 1993). Again because of the high level of inundation, *R. mangle* is the dominant species, and is usually found in narrow mono-specific stands paralleling rivers and creeks. Herb and algal growth tends to be limited because of the dense shade cast by the thick canopy. Prop roots actually submerged in the waterways may support encrusting species, depending on water velocity and sediment load. Vegetation landward of riverine mangroves varies according to local topography. Examples include freshwater marsh, swamp forest, basin mangroves and savanna.

Riverine Scrubs

***R. mangle* consocies:** Red mangrove consocies often with associated algal mats, and occasional sedges where inundation is shallow. This sub-community is found growing on channel banks and submerged ridges associated with the infilling estuaries feeding into Port Honduras, most notably Deep River and Freshwater Creek (via Punta Ycacos Lagoon). Another setting is along the upper reaches of shallow profile rivers and creeks, an example being Ramgoat Creek, Orange Walk District. (Plate 17a and 17b).

Riverine Thicket

***R. mangle* consocies in-filling shallow channels:** Here, the channel is completely colonised by red mangroves, creating a closed canopy and trunk/root maze. Flooding may be subject to wide seasonal variation of several metres. This sub-community is rare, and by far the most extensive example is the channel draining Cobweb Swamp. (Plate 18).

Riverine Forest

***R. mangle* consocies:** The majority of riverine mangroves fall into this category, found on most rivers, although to varying extents[3]. In the north, flat river profiles and the extended dry season allow greater ingress of saline water, so the community extends deeper in land. The New and Northern Rivers are prime examples, and the Hondo to a lesser extent (because of its larger watershed and consequent higher freshwater discharge). (Plate 19).

***R. mangle* with non-mangroves:** In freshwater areas, kaway (*Pterocarpus officionalis*) and provision tree (*Pachira aquatica*) may mix with red mangrove to create a medium to tall riverine forest, a small example of which is found beside the Northern Highway, adjacent to the Belize River Bridge. (Plate 20).

[3] The natural extent of riverine mangroves is difficult to judge in certain cases, because of prolonged alteration to riparian vegetation over hundreds of years of human habitation. The original extent of riverine mangroves along the Hondo, New, Belize and Sibun Rivers are particularly difficult to determine.

DISTURBED MANGROVE COMMUNITIES

Whilst these are not classified separately, there are three wetland sub-communities, often associated with mangroves under natural conditions, that invade basin mangrove environments following clearance.

1: An increasingly common mangrove plagio-climax sub-community is mono-specific stands of the fern *Acrostichum aureum*. Present in natural conditions, this light-demanding species will invade rapidly when basin mangroves are cleared, and rapidly achieving 100% cover, precludes succession of other plants (West 1977, Medina *et al.* 1990). Stands vary between approximately 1-2m in height. *Acrostichum* invasions are retarded where mangrove brashings were still on the ground, probably because of lower light penetration under these circumstances.

2: Clearance of basin mangroves is also being followed by the establishment of a *Typha* community. Loss of tree cover removes all shade, and also produces a higher water table because of lower evapotranspiration. Combined with the interference in drainage which often accompanies clearance, shallow freshwater ponding allows this plant to invade. The *Typha* forms uniform stands up to approximately 2.2m high, achieving 100% cover. Examples are common at cleared sites around Belize City.

3: White mangrove has a tendency to colonise banks of dredge spoil to form pure stands, and this has resulted in this sub-community developing adjacent to artificial canals. The southern exit of Jones Lagoon on the Burdon Canal is the major occurrence of this identified in Belize.

BASIN MANGROVES

1a.

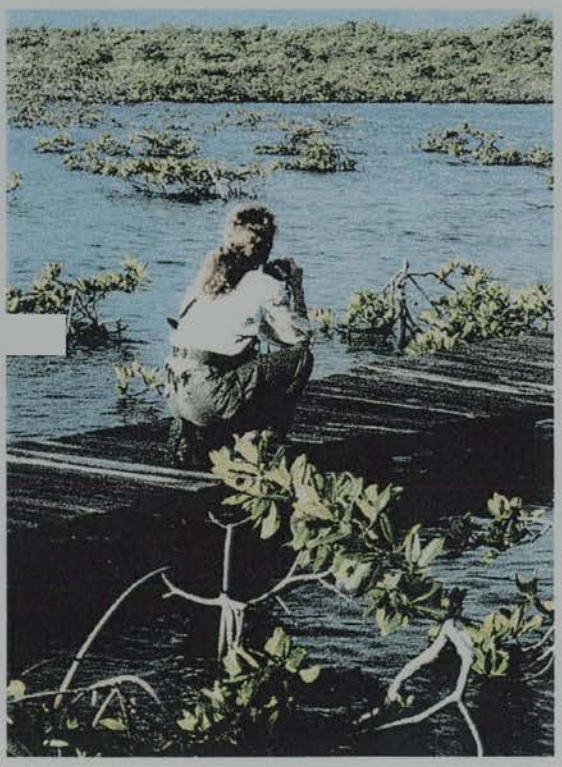
Basin scrub of isolated *R. mangle* clumps in herbaceous marsh.

Almond Hill Lagoon area, Belize District.

1b.

Basin scrub of isolated *R. mangle* clumps in herbaceous marsh.

Another example (from the air) to the west of Midwinters Lagoon, Belize District.



2a.

Basin scrub of (open) *R. mangle.*

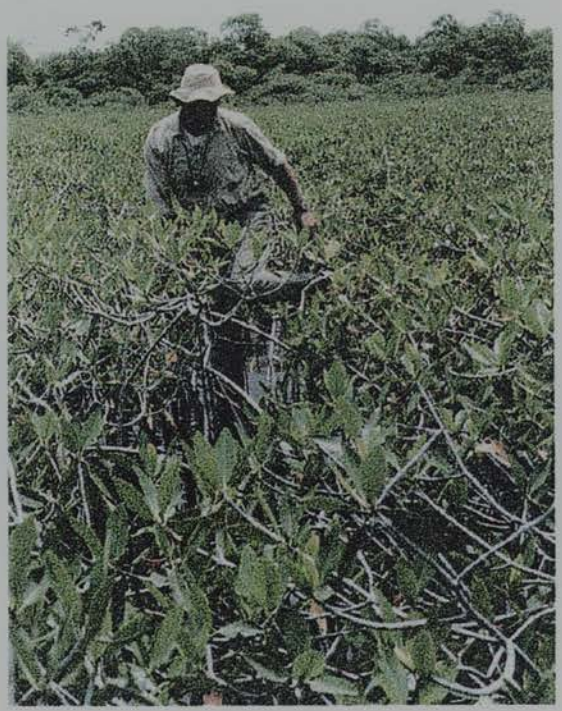
Interior of Spanish Lookout Caye, Belize District.

2b.

Basin scrub of *R. mangle* (intermediate cover).

Northern bank of Deep River, Toledo District.

2c.



Basin scrub of *R. mangle* (closed cover)

Northern bank of Deep River, Toledo District.

3.

Basin scrub of (open) mixed mangrove species.

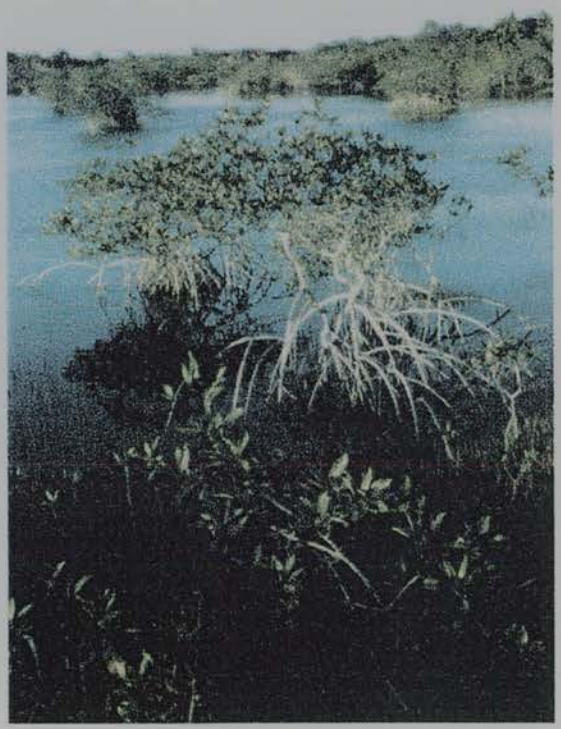
East of San Pedro Lagoon, Belize District (no photo).

BASIN MANGROVES

4.

Basin scrub of *A. germinans* with associated halophytic herbs.

Ambergris Caye, Belize District.



5.

Basin scrub of *R. mangle*, in inland ponds and lagoons.

New River Lagoon area, Orange Walk District.

6.

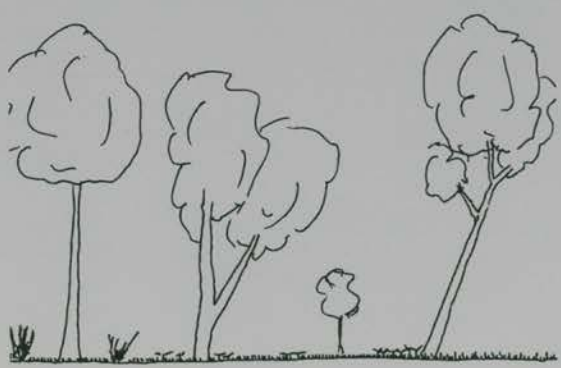
Basin thicket of mixed mangroves.

Mile 7 area, Western Highway, Belize District.

7.

Basin 'orchard' of *L. racemosa* with occassional other mangrove species, and abundant *C. erectus.*

Northern Caye Caulker, Belize District.

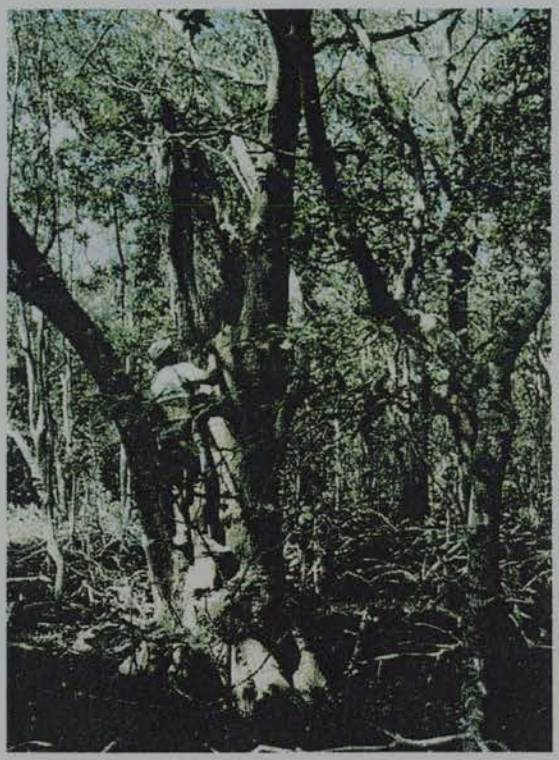


8.

Basin 'orchard' of *A. germinans.*

Southern Ambergris Caye, Belize District (no photo available).

BASIN MANGROVES



9a.

Basin forest of mixed mangroves (predominantly *A. germinans and R.mangle* in this example).

Wippari Caye, Stann Creek District.

9b.

Basin forest of mixed mangroves (predominantly *R.mangle and L. racemosa* in this example).

South of Bar River, Belize District.

10.

Basin forest of *A. germinans.*

Belize City area, Belize District.

11.

Basin forest of mixed mangrove with non-mangrove species.

South of Mother Point, Toledo District.

12a.

Supra-tidal flats scrub of mixed mangroves, with halophytic herbs.

Shipstern area, Corozal District.

12b.

Supra-tidal flats scrub of mixed mangroves, with halophytic herbs.

A second example from Shipstern area, Corozal District.

13.

Overwash forest of *R. mangle*.

Drowned Cayes, Belize District.

FRINGING MANGROVES

14.

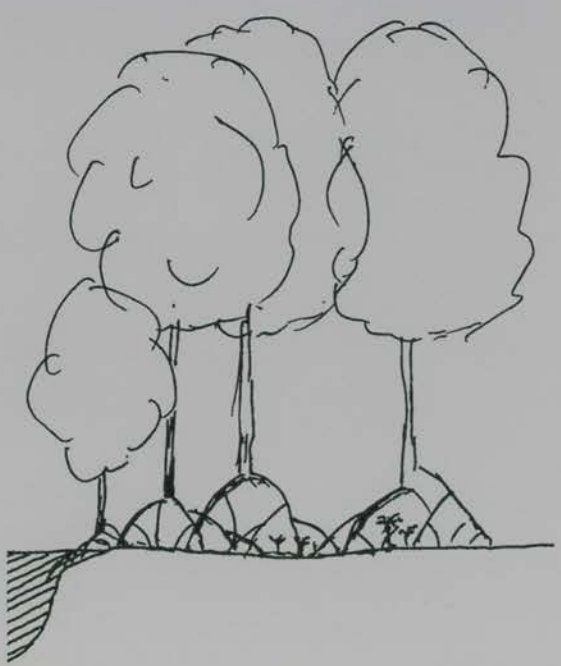
Fringing scrub of *R. mangle*.

Rear side of Placencia Peninsula, Stann Creek District.

15.

Fringing scrub of mixed mangrove prograding into littoral thicket.

Coast to the east of Maskall, Belize District.



16.

Fringing forest of *R. mangle*.

Belize City area, Belize District.

RIVERINE MANGROVES

17a.

Riverine scrub of *R. mangle.*

Deep River tributary, Port Honduras area, Toledo District.

17b.

Riverine scrub of *R. mangle.*

Deep River tributary, Port Honduras area, Toledo District.

18.

Riverine thicket of *R. mangle.*

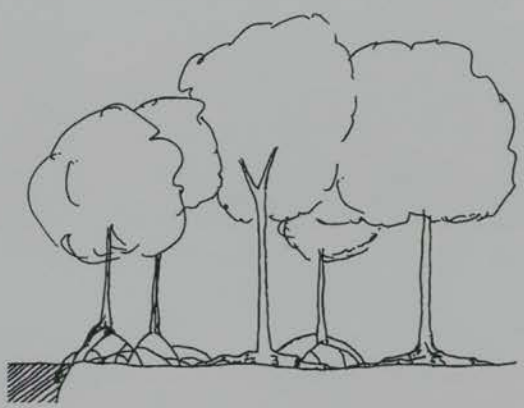
Cobweb Swamp, Belize District

RIVERINE MANGROVES

19.

Riverine forest of *R. mangle*

Bar River, Belize District.



20.

Riverine forest of *R. mangle* and non-mangroves (e.g. *Pachira aquatica).*

Belize River, at Mile 4 on the Northern Highway, Belize District.

Forests (Protection of Mangroves) Regulations

Appendix 5

BELIZE:

STATUTORY INSTRUMENT

No. 52 of 1989

REGULATIONS made by the Minister of Agriculture in exercise of the powers conferred upon him by Section 5 of the Forests Act, Chapter 176 of the Laws of Belize 1980 and all other powers thereunto him enabling

(*Gazetted 6th May*, 1989)

WHEREAS—

(*a*) mangroves border much of the coastline and cayes of Belize and form an important component of the natural vegetation of the country;

(*b*) mangroves are well-known for their protective functions and mitigate the destructive forces of hurricanes and other natural disasters;

(*c*) each species of mangrove provides habitat for a diverse community of plants and animals, including fish and other species;

(*d*) mangroves play a crucial role in the ecology of coastal areas, coral reefs and estuaries and produce and trap concentrations of organic matter which are used by marine organisms in coastal food webs;

(*e*) many of Belize's commercial fish species depend upon the nursery functions of mangrove communities;

(*f*) mangrove communities in Belize provide a dependable water resting ground for a host of species of migratory birds and wildlife;

(*g*) mangrove communities, besides being environmentally protective, are esthetically attractive and can be incorporated into the landscaping of waterfront residences and communities;

AND WHEREAS it is desirable in the national interest to establish rules and regulations to protect mangrove communities;

NOW, THEREFORE, the following regulations shall have effect:

1. These regulations may be cited as the

Short Title.

FORESTS (PROTECTION OF MANGROVES) REGULATIONS, 1989.

2. In these Regulations—

Interpretation.

"alter" or alteration" means to cut, remove, defoliate, or otherwise destroy by any means, mechanical or otherwise, but does not include "selective trimming";

"canopy" means the leafy portion of a tree near the top of the tree. or which extends from near ground and water level to the top of the tree;

"Department" means the Department of forestry in the Ministry for the time being charged with the responsibility for forests;

"Form" means the form annexed to these Regulations;

"jurisdictional waters" means the waters, wetlands, and shoreline areas within the territory of Belize;

"lateral limbs and other branches" means limbs or other branches situated on or coming from the side of the main trunk of a tree;

"mangrove" means any specimen of the following species:—

Black Mangrove	Avicennia germinans
Red Mangrove	Rhizophora mangle
White Mangrove	Laguncularia racemosa;

Provided that the Minister may, by order published in the *Gazette*, add any other species;

"prop roots" means the structure originating below the lowest limbs of red mangrove, which are also known as stilt roots;

"selective trimming" means:—

(a) removal of not more than 25% of the lateral limbs or other lateral branches of any black or white mangrove, provided that no tree under six feet in height is cut;

(b) reduction in height of any black or white mangrove by 25% or less of the height of the untrimmed tree, provided that no tree under six feet in height is cut; and

(c) removal of not more than 25% of the plant material in the lower half of the canopy of any red mangrove, provided that the upper half of the canopy and the prop roots are not cut;

"permit" means — a permit for alteration of mangroves issued under these Regulations.

Prohibition on alteration of mangroves.

3. Unless specifically exempted under these Regulations, no person shall alter, allow or cause to be altered any mangrove in jurisdictional waters without first obtaining a permit from the Department. This prohibition applies both to privately-owned lands and public lands.

Permit procedure.

4. (1) A person desiring to alter mangroves in jurisdictional waters shall apply for a permit in Form 'A'.

(2) The alteration of mangroves which causes the disturbance or excavation of the sediments in jurisdictional waters or the deposition of materials in jurisdictional waters may be considered dredging or filling, and shall be permitted only under exceptional circumstances.

(3) The following non-refundable fee shall be payable in respect of an application for permit for alteration of mangroves:—

(a) less than 1/10th of an acre $25.00

(b) between 1/10th of an acre but not more than one acre $50.00

(c) more than one acre $300.00

(4) As soon as practicable but not later than forty-five (45) days of the receipt of an application for permit, the Department shall examine the application and notify the applicant of any apparent errors or ommissions and require such additional information as may be necessary for the processing of the application.

(5) For applications to alter mangroves in an area larger than one acre, the Department shall publish in a local newspaper notice of the applicant's intent to alter mangroves within a specified period of time. For smaller areas of mangrove alteration, the Department may not publish such a notice.

(6) The Department shall notify the applicant if the proposed activity is exempt under these Regulations or qualifies for a permit.

(7) Where the Department refuses to grant the permit, or issues a notice of its intent so to do, it shall give the reasons for such refusal in general terms and may require any amendments in the application for permit.

(8) A permit issued by the Department may contain specific conditions considered reasonable and necessary to ensure compliance with the general spirit and intent of these Regulations.

(9) The Department may refuse a permit if the applicant, after receiving written notice of intent to refuse the permit, fails to provide required information or fails to correct errors or ommissions or does not furnish the additional information within the time specified in the notice.

Factors to be considered for issuing or denying permits.

5. (1) No permit for the alteration of mangroves shall be issued unless the Department is satisfied that—

(*a*) water quality shall not be significantly lowered or changed as a result of the proposed alteration; and

(*b*) the proposed mangrove alteration is not contrary to the public interest, or if the alteration significantly degrades or changes the environment that such action is, on the whole, beneficial and in the larger and long-term interest of the people of Belize.

(2) In determining whether a project is not contrary to the public interest or is clearly in the public interest despite environmental damage, the Department shall consider and balance the following factors—

(*a*) whether the project shall affect the public health, safety, welfare or property of others;

(*b*) whether the project shall affect the conservation of fish and other wildlife species and endangered or threatened species or their habitats;

(*c*) whether the project shall adversely affect navigation or the flow of water or cause harmful erosion, silt deposition or shoaling;

whether the project shall adversely affect the fishing or recreational values or marine productivity in the vicinity of the project, or more generally along the Belize coast.

whether the project will be of a temporary or permanent nature;

(*f*) whether the proposed project shall adversely affect the significant historical or archaeological resources of the country;

(*g*) the current condition and relative value of the functions being performed by or in the areas affected by the proposed activity;

(*h*) the proximity of the project to a designated park or other type of protected area, wildlife sanctuary or natural monument;

(*i*) the proximity of the proposed project to coastal and reef areas known to be of outstandingly high ecological value.

(3) If the applicant is unable to meet the criteria set out in sub-regulation (2), the Department, in deciding whether to grant or deny a permit, shall consider measures proposed by or acceptable to the applicant to mitigate adverse effects which may be caused by the proposed project. Such mitigation specifically may include restoration of mangrove communities in other or adjacent areas, and the planting of mangrove trees in coastal areas already altered or deteriorating by erosion.

(4) The Department, in deciding whether or not the permit should be granted, shall also consider:—

(*a*) the economic and environmental impacts of the project for which the permit is sought;

(*b*) the impact of projects which exist or are under construction, or for which permits are already being sought;

(*c*) existing or proposed national, regional and local land-use plans, such as, barrier reef regional management and development plans, Ambergris Caye land-use plan, etc ;

Circumstances where permit may not be issued.

6 (1) No permit shall be issued for alteration of mangroves by means of chemical defoliants or herbicides

(2) No permit shall be issued for the alteration of any mangrove which is formally classified by the Department as an active nesting site or as a resting or breeding area for a colony or conspicuous concentration of birds, including but not limited to pelicans, spoonbills, herons, storks, boobies, frigatebirds, and egrets.

(3) No permit shall be issued for mangrove alteration within an existing national park, nature reserve, wildlife sanctuary, or natural monument as defined and described in the National Parks System Act, of 1981.

No. 5 of 1981.

Exemptions.

7 (1) No permit under these Regulations is required for the alteration of mangroves—

(*a*) by duly constituted communication, water, sewer, electrical or other utility companies in, or adjacent to, a public or private easement or right-of-way, provided such alteration is limited to those areas necessary for maintenance of existing lines or facilities or for construction of new lines or facilities to provide utility service to the public, and that such alteration is conducted so as to avoid or minimize any unnecessary alteration of mangroves;

(*b*) by a licensed land surveyor in the performance of his duties provided such alteration is limited to a swath for survey sighting three feet or less in width;

(*c*) for selective trimming by the owner of a parcel of property on the property which he owns.

Manner of disposal of materials by selective trimming.

8 Plant material removed by selective trimming of mangroves shall be disposed of in an orderly and inconspicuous manner. Small trunks and limbs (less than 1 inch in diameter) may be left in the mangroves habitat, but larger trunks and limbs (greater than 1 inch in diameter shall be disposed of in an upland location so as not to impede or restrict water movement or create a hazard to navigation:

Provided that the bark on the remaining trunks, limbs or other branches is not damaged.

Prohibition on use of pruning paint.

9. Pruning paint shall not be used on mangroves; such method being inconsistent with the general policy of minimizing environmental pollution.

Variance Relief.

10. Upon receiving an application for mangrove alteration, the Department may grant a variance from the provisions of these Regulation if the compliance therewith is likely to result in unnecessary hardship on the owner or any other person in control of the affected property. Relief from such hardship may be granted only upon demonstration by the landowner or affected party that the hardship is peculiar to the affected property and not self-imposed, and that the grant of a variance shall be consistant with the general intent and purpose of these Regulations, e.g., the protection and maintenance of healthy mangrove communities all along the coasts and cayes of Belize. In keeping with the spirit and intent of these Regulations, the Department shall grant variances only under exceptional circumstances.

Offences.

11. Every person who contravenes any of the provisions of these Regulations shall be guilty of an offence and shall be liable on summary conviction to a fine not exceeding five hundred dollars, or to imprisonment for a term not exceeding six months, or to both.

MADE this 28th day of February, 1989.

(DEAN R. LINDO)
Minister of Agriculture

Printed by the Government Printery

FORESTS (PROTECTION OF MANGROVES) REGULATIONS, 1989

FORM A

Application for Permit

(Regulation 4(1))

1. Name of the applicant.
2. Description of the property on which mangroves are to be altered.
3. Description of the mangroves.
4. Nature of proposed alteration.
5. Whether the property belongs to the applicant or to another person.
6. The manner in which alteration is to be effected.
7. Prescribed fee of $ .....has been deposited in the Treasury vide Receipt No.....
   .....dated .....

I _____, owner/occupier of _____

do hereby declare that the particulars furnished hereinbefore are true to the best of my knowledge and belief.

_____ _____

DATE

SIGNATURE AND ADDRESS
OF THE APPLICANT

Mangrove Mapping in Belize: Evaluation and Technical Background — Appendix 6

This appendix is divided into two sections. Firstly, an evaluation is provided of the existing land cover maps that include mangrove. This concludes that due to scale or inaccuracy, none provide sufficiently detailed coverage of mangrove extent for this study. The second section gives the technical details of the mangrove mapping undertaken for this research.

The Evaluation of Mangrove Mapping in Belize

National Mapping Projects

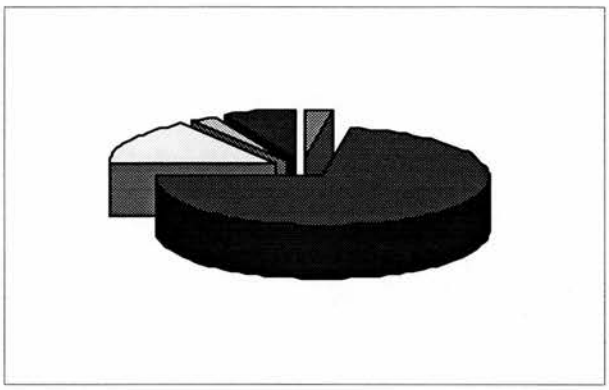
Sapper: The first known attempt to map Belize's mangroves was by the German geologist K. Sapper in 1896. The basic pattern of mangrove distribution along the coast was obtained, but, not surprisingly, given the difficulty of covering the terrain and the small size of his team, the results produced were rudimentary. The map was produced at a scale of approximately 1:250,000. A copy is held at the UK's Public Records Office in Kew, London.

Kinloch: The second mapping exercise to include mangroves was the Forest Department's National Land Cover Survey 1931-1933, overseen by the Conservator of Forests, J. B. Kinloch. Data was collected almost exclusively from line surveys although it was supplemented by aerial reconnaissance when the forester involved twice hitched a ride on the Pan Am flying boat traveling down the coast on the Miami-Canal Zone route (Forest Department 1938, para. 8). Apart from a series of progress and annual reports (Forest Department 1933 Appendix 1, 1934 Appendix 1, 1935 paras. 19-23), the full results of the National Land Cover Survey do not appear to have been published. The most detailed statement of results therefore appears to be that prepared by Stevenson (1935) for the Empire Forestry Conference.

Kinloch's team achieved a relatively accurate assessment of mangrove forest coverage, of 2.8% of the country (equivalent to 64,303ha). Part of the reason for the under-estimate is that the additional *brackish water savanna* category identified by Kinloch was not quantified to add to this figure (Stevenson 1935). The overall land cover results produced by Kinloch are shown in Figure A3. The map was produced at a scale of approximately 1:350,000. A copy is held at the Forest Department, Belmopan.

Figure A3 Per cent land cover from the National Land Cover Survey 1931-1933

Mangrove	2.8
Other Broadleaf Forests	72.1
Pine Forests and Dry Savannas	15.4
Wet Savannas	2.7
Existing and Recently Abandoned Cultivation	7.0
Total	**100**



Provisional Map Series: The third additional source of mangrove information is found on the Provisional 1:50,000 National Map Series (1948-53). This was the first systematic and comprehensive mapping of Belize. It included cadastral, topographic and land cover data, and is the basis from which the present 1:50,000 topographic maps are derived. The Forest Department had considerable input into this original project, contributing extensive vegetation information. Derived not only from extensive fieldwork (line cruising), evidence of vegetation distribution was collected from air photos interpretation, the value of which was increasingly being recognised in Belize. Kinloch, in particular, was instrumental in developing its use for land cover mapping (see Kinloch 1940 and Sisal 1946).

There are two main draw-backs with the Provisional Map Series in relation to mangroves. Firstly, although mangroves are categorised as a separate class, it was not applied consistently. Comparison with more recent maps shows that mangroves were also categorised as *swamps* or *medium bush*. Secondly, the boundaries between different land cover blocks are not always delineated, making it impossible to tell where one begins and another ends. The combination of these characteristics undermines the value of the maps for the purpose of this study, particularly in respect of quantification of mangrove area. They are however, a useful historical reference for identifying the extent and distribution of human activities (farming, settlements, transport infrastructure etc.) during the late 1940s/early 1950s.

Current National 1:50,000 Map Series: Although the cadastral and other data have been dropped from the National Map Series, a mangrove class has still been retained, particularly in the military versions of these 1:50,000 sheets. Again, this cannot be used as a reliable indication of mangrove extent because it is not applied consistently. On these maps, mangrove areas are commonly shaded as *forest*, for example. Furthermore, it is also worth noting that the coastline

shown on these maps (derived from 1940s and subsequent air photo interpretation), from which the GIS coverage was taken, contains errors. In particular, the configuration of the coast of Ambergris Caye is widely different from the actual alignment, as is the case for the south-east section of the Belize City shoreline. As well as introducing a degree of error into area calculations, these inaccuracies also inhibit the accurate overlay of other data sets. Until such time that a more accurate version is produced however, this is the only coastline available. More detailed, geometrically corrected large-scale base maps are urgently needed for coastal zone management purposes.

Wright *et al.* (1959) National Vegetation Map: The fourth work, of Wright *et al.* (1959) a major improvement of Kinloch's work in distribution accuracy, produced a original mangrove coverage mangrove coverage of 74,874ha (3.3% of Belize's land area) from extensive ground truthing and interpretation of 1:40,000 b/w air photos. Whilst the cayes were included, areas of mangrove inland of the main coastal belt were not separately mapped. Unfortunately, the original mapping is no longer extant but only now available agglomerated to 1:250,000. Furthermore, while the spatial accuracy was high, the mangrove sub-communities mapped are misleading (C. Wright, pers. comm. 1993). As Wright explained, the survey was mainly interested with agricultural potential so little attention was paid to mangroves, as they were considered unsuitable for farming. Also, although areas of saline herbaceous marsh (including scattered mangroves) were categorised in the text ('a small area ... not examined in detail' :300), they were not mapped or quantified. Wright's figure remained the most accurate estimate for over 30 years.

LSD/FAO National Land Cover Map: The LSD/FAO National Land Cover Mapping Project (1991-93) used manual interpretation of 1:50,000 enhanced colour hard copies of recent SPOT satellite imagery, with resulting land cover patterns transferred to GIS. Mapping did not however, cover the cayes. More importantly, examination of the results has identified several misclassified areas. Results for mangrove at least, are not considered accurate.

Iremonger and Brokaw (1994): Finally, the most recent land cover map by Iremonger and Brokaw (1994) produced from Landsat TM images, and again collated on GIS (but with restricted ground truthing) includes seven mangrove-related sub-communities. It is a potentially valuable over-view but awaits further field verification before confidence can be put in the distribution patterns shown. The main problem identified to date is the poor geo-referencing of the original satellite image. This invalidates quantification of the derived

mangrove classes and inhibits over-laying with other data sets. This is particularly the case in southern Belize, where the off-set is in the region of 2-4 km.

Regional Mapping of Mangroves

In addition to these national initiatives, mapping has been undertaken for specific parts of Belize. As a result, mangroves have been mapped for the Belize River Valley Survey by Jenkin *et al.* (1973), the Southern Coastal Plain Forest Inventory by Johnson and Chaffey (1974), the Rio Bravo area by Brokaw and Mallory (1993) and Vasquez (1997), and Belize City by McShane (1991). Their limited scope precludes their use in this study, although they were used to help verify the mangrove distribution produced for this thesis.

The Production of the National Mangrove Map

Explained below is the procedure for producing the mangrove distribution data for this thesis. This worked spanned the period 1989-97, and encompassed three revisions, the first involving two other colleagues and the latter two the author. With more resources at each stage, the result was an improved level of accuracy and detail for each edition. Initially, only Landsat TM imagery was available, with limited time for ground truthing. Subsequently, comprehensive air photo coverage became available, with additional logistical support for ground checking and over-flights. By the third edition, produced for this thesis, the delineation of mangrove is almost certainly the most comprehensive mapping of a habitat type undertaken in Belize to date.

The first 'edition' of the mangrove maps was essentially a 'quick and dirty' exercise, carried out by Gray *et al.* (1989). A number of short-comings arose, but nonetheless, reliable results were produced for certain areas. Before describing these and the method used, the main faults with the first edition were:-

- misclassification of riparian forests as mangroves
- several small areas omitted due to cloud cover
- misclassification of land cover in shadow of clouds
- inclusion of area of Mexican mangroves, at north end of Ambergris Caye
- errors from other sources incorporated for southern Toledo District, for which satellite imagery was not available

As a result of these short-comings, only part of the first edition distribution has been retained, specifically the mainland mangrove areas which remain unaltered, with no cloud cover or riparian forest. For these, the mapping process is now explained.

Based on ground information collected from a number of sites in 1988 and 1990, an unsupervised classification was carried out on two images (acquisition date 4th January 1987) from the Landsat 5 Thematic Mapper (TM) sensor (WRS Path 19 Rows 47 and 48). This sensor provides a very good spectral resolution and intermediate spatial resolution (30m x 30m) which makes it ideal for mapping complex vegetation. The computer software used for image analysis consisted of the ERDAS Image Processing System (Version 7.4). Geometric correction of the images was undertaken to remove distortions caused by the orbital characteristics of the satellite and to geo-reference the data to a coordinate system (UTM). The procedure involved is straightforward, if time-consuming. Common points were identified on the image and the UTM coordinates shown on Belize's 1:50,000 map series. As well as making the resulting mangrove maps compatible with the existing topographic series and the GIS, the use of the UTM grid allowed quantification of the area in square meters. Over 100 control points were selected on the image and map base, and overlain. The root mean square error (in meters) between them was calculated, and accepted where below the size of one pixel (i.e. 30m). The process was completed using a linear interpolation for the transformation.

For the image classification itself, the automated unsupervised processing procedure was adopted as a response to two particular factors. The first is the difficulty of obtaining an even cover of ground information for training, because of the inaccessibility of many sites. Often this results in detailed knowledge obtained for a relatively small area, typically accessible by road or river. In projects like this, which aim to map large areas of complex vegetation and land use, this is compounded by the near impossibility of selecting training areas which are representative of *all* classes of land cover. The second reason is that generalisation of reflectance/vegetation relations derived from these small 'training' areas to a national scale can introduce significant inaccuracies because of the increasing variation from different atmospheric conditions across the mapping area. Misclassification therefore can occur, as the algorithm attempts to assign pixels to one of the user-defined classes. Whilst some of this can be removed using thresholding techniques, it is likely that major discrepancies will occur, particularly in area further from sites used for training areas.

For these reasons, it was decided to adopt an unsupervised approach to classification. In this method, classes are based solely upon the spectral characteristics rather than an *a priori* knowledge of the sites of known land cover. Any clusters which exist in the data - and which could represent particular types of vegetation will be picked up by the clustering procedure. The clustering algorithm chosen is referred to as the Iterative Self-organising Data Analysis Technique. Out of the seven bands provided by Landsat TM, bands 3, 4 and 5 are the most suitable for vegetation mapping (FAO 1994). These allowed optimum visual discrimination of the mangrove/non-mangrove boundary. In order to maximise the contrast across this boundary *and* within the mangrove area itself, two band ratios were used.

While the clustering itself is largely an automatic procedure, the resulting classes still have to be amalgamated into appropriate land cover categories, relevant to research needs. This is where ground truthing information comes into play. During field work, the emphasis was on defining the extent of the various mangrove communities in relation to adjacent land cover types. Photographs of the satellite imagery taken of the screen during image processing were laminated and taken into the field in order to correlate image characteristics with land cover features on the ground. At each field site, the particular false colour representations were allied to the associated land cover type.

The resulting field information was used to inform the automated classification. Initially, the algorithm classified the whole image into 24 classes. Areas known not to be mangrove were then masked from the data set, and the automated classification was re-run on the remaining image. In this instance, it was specified that the data should be classified into 13 classes, sufficient to differentiate the data but too few to create meaningless levels of division between similar types of land cover. Once complete, and again based on the ground data, these classes were assigned to non-mangrove, and therefore dropped, or one of four mangrove categories. These, tall, medium, dwarf and mangrove savanna, were found to be the ones that could be identified based on structural characteristics that also had some relevance to management needs. The raster map of mangrove distribution that resulted was transferred onto Arc/Info GIS.

The other short-comings from this stage that are listed above were covered as shall be explained. However, two main residual limitations exist with this satellite-derived data. Firstly, there is the difficulty in accurately delineating the boundary between mangrove and other savanna types. The structure, distribution and biomass of these communities appear relatively similar and further research is required into separating these different vegetation types.

Secondly, there are extensive areas, particularly on Ambergris and other smaller cayes, where mangrove grows sparsely in shallow lagoons. These basin and fringe communities are not being detected by the Landsat imagery and again further research is needed into their detection.

This was the output from the first edition mangrove mapping that was used. In order to refine the mangrove map, greater spatial resolution was required as well as a means to over-come the problems listed above. In particular, small scale alterations commonly identified during fieldwork included individual house lots, fishing camps and tourist sites. These were not detectable from the Landsat TM image, being of sub-pixel dimensions (less than 30m x 30m).

The solution was to adopt a multi-platform approach. Specifically, 1:44,000 black and white air photos were used to map areas where clearances were taking place, and to map mangroves under cloud, in shadow or along rivers. Air photos also proved better suited to mapping mangroves on the cayes, where they often occurred in small areas or as narrow fringes, poorly detected by Landsat. Natural and altered mangroves were mapped from the air photos, transferred onto acetate and from there to the 1:50,000 National Map Series. This was digitised for incorporation with the raster data already on the GIS. Where no 1:50,000 base maps existed (i.e. the majority of the cayes), the land cover were interactively entered onto the GIS (i.e. screen digitised, by eye) against a backdrop of the 1:250,000 map of the coast.

This refinement was done in two stages, and has created a coverage that is a combination of raster and vector data. The initial revision led to the second edition of the national mangrove map, reported in Zisman (1992). This removed the gross errors and filled in cloud and shadow-obscured regions. The final level of refinement was completed for this thesis. This third edition included the mapping of mangrove alteration, detailed field checking, and correction of riverine mangroves. The data files for the GIS coverage were also rationalised (i) to ensure all areas were correctly coded by land cover category and (ii) to reduce the size of the computer file, for ease of data handling and to minimise the disk space that the coverage demands. Consequently, the data includes a unique number for each land cover 'polygon', its area in square metres, and a code indicating its land cover category. There are approximately 18,000 polygons for the entire data set. The land cover classes that were used for the third edition are listed in Table A1. By adding the areas of all the polygons coded for different types of mangrove alteration (e.g. filled, degraded, housing, tourism etc.) to the areas of 'natural' mangrove remaining (tall, medium, dwarf etc.), a figure was derived for the original mangrove cover. The delineation of which anthropomorphic land cover types had originally been mangroves used two sources. Firstly

reference was made to 1935 air photos held at the LSD, and secondly, field surveys were undertaken to identify any residual features (peaty soil, fill, flooding levels) and local knowledge of inhabitants which would indicate former mangrove extent.

For the Belize City region, additional mapping was generated from March 1992 colour air photos enlarged to 1:8,000. Land cover was traced off the resulting nine sheets (averaging roughly 55cm x 65cm), on to acetate sheets, and from here digitised and joined using GIS.

Table A1 Details of land cover categories used in mangrove mapping

Land Cover Class	Description
Natural land cover classes	
Tall mangrove	Approx. > 7 or 8m in height
Medium mangrove	Approx. 3 or 4m to 7 or 8m in height
Dwarf mangrove	Approx. < 3 or 4m in height
Mangrove savanna	Scattered dwarf mangroves with halophytic herbs
Mixed forest including mangroves	Riparian freshwater forest and mangroves
Open water with scattered mangroves	Ponds, lagoons and coastal fringes with sparse mangrove
Open water with herbaceous cover	Ponds and lagoons with sparse herbaceous cover
Herbaceous (sedge)	Permanent freshwater wetlands with dense sedge cover
Herbaceous (reeds)	Permanent freshwater wetlands with dense reed cover
Herbaceous (grass)	Intermittent freshwater wetlands with dense grass cover
Acrostichum	Permanent brackish wetlands with dense *A. aureum*
Savanna	Pine savanna (may include freshwater wetlands)
Forest	Closed canopy broadleaf forest
Thicket	Closed canopy broadleaf thicket
Palmetto thicket	Mixed thicket of *Acoelorrhaphe wrightii* and other spp
Palmetto	Pure thicket of *Acoelorrhaphe wrightii*
Water	Ponds, lagoons and rivers.
Bare ground	No natural vegetation (includes salinas)
Areas previously mangrove, but now	
Degraded mangrove	Any mangrove area significantly altered by human action
Cleared mangrove	Any mangrove cleared by human action
Filled mangrove	Any mangrove filled by human action
Housing (mainly high density)	Areas of continuous housing with small or no gardens
Housing (mainly medium density)	Housing areas with large gardens & some vacant lots
Housing (mainly low density)	Patchy housing with vacant lots and undeveloped land
Tourism	Hotels, their associated recreation areas and facilities
Recreation	Parks, sports grounds etc.
Industry and Commerce	Areas dominated by industrial or commercial properties
Quarry	Areas from which material has been excavated
Institutional	Government offices, schools, libraries etc.
Port	Industrial harbours and ports
Waste Disposal	Waste dumps
Aquaculture	Ponds, associated facilities and clearances
Agriculture	Current or recently abandoned area used for crops
Fishing Camp	Clearance for hut, drying wracks etc. used by fishermen
Transport	Major roads
Road	Minor roads
Airstrip	Airports and airstrips
Marina/Boat Access/Dock	Non-industrial harbours and boat access
Canal	Artificial channel now or previously used for transport
Drainage Ditch	Channel created for drainage purposes
Degraded forest	Any forest area significantly altered by human action
Other	Any land use that does not fall into one of the above.

Mapping Accuracy of the National Mangrove Map: Sources of mapping error in the production of the National Mangrove Map series have been reviewed by Zisman (1992), with further remote sensing details in Gray *et al.* (1990). Two mapping projects for Florida's mangroves produced results accurate to +/- 15% (Myers *et al.* 1990), considered to be an acceptable target. From these a qualitative assessment of overall accuracy gives mapping success in approximately 85% to 95% of cases, depending on the type of community. Accuracy of height class was less precise, falling within the 50-80% range.

Summary and Requirements for Further Work

The mapping carried out for this study has led to the third edition of the national mangrove map for Belize, and enabled the quantification of 1990 (1988 for Ambergris Caye) and original mangrove extent. An additional map has been produced for the Belize City region for 1992. The coverage is the most comprehensive map of mangroves produced to date, and the one which has been subjected to most detailed ground checking. Nonetheless, there are a number of basic improvements that can be made. These are as follows:-

1. Ambergris Caye needs to be mapped for 1990 to give a consistent figure for the whole country. Whilst there is no 1990 air photography for the area in Belize or the UK (i.e. British military), it is likely that suitable imagery is available in the USA.

2. A new base map is needed for Ambergris Caye (and to a lesser extent, south-east Belize City) because the coastline shown is significantly different from the actual configuration of the shore.

3. The resolution and scale of present sources severely inhibits accurate mapping of land cover on the cayes. Therefore, comprehensive large-scale mapping (1:5,000) is needed of all the cayes, the majority of which are only mapped at 1:250,000 at present. Onto these base maps, a more accurate interpretation of land cover can then be made.

4. The extent and use of mangrove needs to be up-dated for the mid to late-1990s, to allow for continued monitoring of mangrove exploitation. The areas altered in the intervening period should be overlaid with property boundaries (available from the Land Information Centre, Ministry of Natural Resources, Belmopan. By comparison with the mangrove permit database, this would enable the properties to be identified where mangroves had been cleared with or without permits.

SUMMARY DATA FROM THE ANALYSIS OF APPLICATIONS FOR MANGROVE ALTERATION PERMITS (1989-1995) Appendix 7

The following tables provide a summary of the key characteristics of all 110 applications for permits to alter mangroves, made to the Forest Department over the period May 1989-July 1995. Applications made for mangrove trimming are also included, although this type of alteration is, in fact, exempt from the Regulations. A copy of the Forests (Protection of Mangroves) Regulations, 1989 is included in Appendix 5.

NO.	AREA	APPLIED (ha)	GIVEN (ha)	MAIN LAND USE	APPLIED	TIMING	RESULT
1	BIG CREEK	6.08	6.08	PORT	01/06/89	BEFORE	QUALIFIED
2	LADYVILLE	4.05	0.00	AQUACULTURE	11/09/89	BEFORE	REFUSED
3	BELIZE CITY	2.03	2.03	TOURISM	30/10/89	UNKNOWN	QUALIFIED
4	AMBER-GRIS CAYE	8.10	8.10	HOUSING COMMERCIAL HOLIDAY	31/10/89	BEFORE	TRIMMING
5	BELIZE CITY	40.24	0.00	HOUSING COMMERCIAL PRIVATE	10/11/89	BEFORE	WITHDRAWN
6	AMBER-GRIS CAYE	0.41	0.41	HOUSING COMMERCIAL HOLIDAY	30/11/89	UNKOWN	QUALIFIED
7	CONSEJO SHORES	6.08	0.00	HOUSING COMMERCIAL HOLIDAY	05/12/89	UNKNOWN	UNKNOWN
8	BELIZE CITY	6.72	6.72	HOUSING COMMERCIAL PRIVATE	17/07/90	AFTER	QUALIFIED
9	SIBUN	10.13	0.00	TOURISM	17/07/90	BEFORE	UNKNOWN
10	TURNEFFE ISLANDS	0.04	0.04	MARINA/BOAT ACCESS	17/07/90	BEFORE	QUALIFIED
11	BELIZE CITY	1.82	1.82	MARINA/BOAT ACCESS	20/08/90	BEFORE	QUALIFIED
12	TURNEFFE ISLANDS	4.05	1.62	FISHING CAMP	22/08/90	BEFORE	QUALIFIED
13	CAYE CAULKER	0.31	0.31	TOURISM	14/09/90	AFTER	QUALIFIED
14	TURNEFFE ISLANDS	1.22	1.22	TOURISM	19/09/90	BEFORE	QUALIFIED
15	PLACENCIA VILLAGE	0.41	0.41	HOUSING COMMERCIAL HOLIDAY	05/11/90	BEFORE	QUALIFIED
16	BELIZE CAYES (OTHER)	4.05	4.01	AQUACULTURE	22/01/91	BEFORE	QUALIFIED
17	PLACENCIA VILLAGE	0.15	0.15	HOUSING COMMERCIAL HOLIDAY	27/01/91	BEFORE	QUALIFIED
18	PLACENCIA	0.09	0.00	MARINA/BOAT ACCESS	16/05/91	BEFORE	INCOMPLETE
19	SIBUN	4.05	4.05	TOURISM	05/06/91	BEFORE	QUALIFIED
20	ST. GEORGE'S CAYE	0.08	0.08	MARINA/BOAT ACCESS	03/07/91	BEFORE	UNKNOWN
21	CONSEJO SHORES	0.91	0.91	HOUSING COMMERCIAL RETIREMENT	24/07/91	BEFORE	QUALIFIED

NO.	AREA	APPLIED (ha)	GIVEN (ha)	MAIN LAND USE	APPLIED	TIMING	RESULT
22	BELIZE CAYES (OTHER)	6.08	0.00	TOURISM	17/09/91	BEFORE	UNKNOWN
23	ST. GEORGE'S CAYE	0.47	0.20	HOUSING PRIVATE PRIVATE	04/06/92	BEFORE	QUALIFIED
24	CAYE CHAPEL	2.03	2.03	HOUSING COMMERCIAL HOLIDAY	04/09/92	AFTER	QUALIFIED
25	PLACENCIA VILLAGE	2.03	2.03	HOUSING COMMERCIAL HOLIDAY	15/10/92	BEFORE	QUALIFIED
26	BELIZE CITY	0.41	0.41	BUSINESS	27/10/92	BEFORE	QUALIFIED
27	PLACENCIA VILLAGE	0.41	0.41	HOUSING COMMERCIAL HOLIDAY	27/10/92	AFTER	QUALIFIED
28	BELIZE CITY	3.48	3.36	HOUSING COMMERCIAL PRIVATE	02/11/92	BEFORE	QUALIFIED
29	BELIZE CITY	0.89	0.89	HOUSING COMMERCIAL PRIVATE	30/11/92	BEFORE	QUALIFIED
30	PLACENCIA	0.20	0.00	MARINA/BOAT ACCESS	07/12/92	BEFORE	UNKNOWN
31	BELIZE CITY	0.79	0.79	BUSINESS	24/12/92	BEFORE	QUALIFIED
32	BELIZE CITY	1.60	1.57	HOUSING COMMERCIAL PRIVATE	21/01/93	BEFORE	QUALIFIED
33	PLACENCIA VILLAGE	0.00	0.00	HOUSING PRIVATE HOLIDAY	17/02/93	BEFORE	TRIMMING
34	BELIZE CITY	0.04	0.04	BUSINESS	01/03/93	BEFORE	QUALIFIED
35	BELIZE CITY	1.22	1.22	HOUSING COMMERCIAL PRIVATE	03/03/93	BEFORE	QUALIFIED
36	BELIZE CITY	0.32	0.32	PORT	03/03/93	BEFORE	QUALIFIED
37	PLACENCIA	0.10	0.10	MARINA/BOAT ACCESS	04/03/93	BEFORE	QUALIFIED
38	BELIZE CITY	0.81	0.81	BUSINESS	29/03/93	BEFORE	QUALIFIED
39	BELIZE CITY	2.03	0.41	TRANSPORT	31/03/93	BEFORE	QUALIFIED
40	BELIZE CITY	0.81	0.81	BUSINESS	01/04/93	BEFORE	QUALIFIED
41	BELIZE CITY	1.22	1.22	BUSINESS	02/04/93	BEFORE	QUALIFIED
42	BELIZE CITY	0.81	0.81	BUSINESS	02/04/93	BEFORE	QUALIFIED
43	BELIZE CITY	1.42	1.42	HOUSING PRIVATE PRIVATE	14/04/93	BEFORE	QUALIFIED
44	BELIZE CITY	0.81	0.81	RECREATION	15/04/93	BEFORE	QUALIFIED
45	AMBER-GRIS CAYE	0.10	0.10	HOUSING PRIVATE HOLIDAY	16/04/93	BEFORE	TRIMMING
46	BELIZE CITY	0.04	0.04	HOUSING PRIVATE PRIVATE	16/04/93	BEFORE	QUALIFIED
47	BELIZE CITY	1.90	1.83	UNKNOWN	20/04/93	BEFORE	QUALIFIED
48	PUNTA GORDA	3.65	3.65	MARINA/BOAT ACCESS	23/04/93	BEFORE	QUALIFIED
49	BELIZE CITY	0.81	0.81	HOUSING COMMERCIAL PRIVATE	29/04/93	DURING	QUALIFIED
50	STANN CREEK CAYES (OTHER)	0.08	0.08	TOURISM	06/05/93	BEFORE	QUALIFIED
51	BELIZE CITY	14.58	14.58	INDUSTRY	18/05/93	DURING	QUALIFIED

NO.	AREA	APPLIED (ha)	GIVEN (ha)	MAIN LAND USE	APPLIED	TIMING	RESULT
52	STANN CREEK CAYES (OTHER)	0.00	0.00	TOURISM	18/05/93	BEFORE	TRIMMING
53	CAYE CAULKER	4.05	4.05	HOUSING COMMERCIAL HOLIDAY	23/05/93	DURING	QUALIFIED
54	BELIZE CITY	0.41	0.41	HOUSING PRIVATE PRIVATE	26/05/93	BEFORE	QUALIFIED
55	BELIZE CITY	6.08	6.08	RECREATION	07/06/93	DURING	QUALIFIED
56	BELIZE CITY	0.01	0.01	INDUSTRY	22/06/93	BEFORE	QUALIFIED
57	TURNEFFE ISLANDS	0.10	0.00	FISHING CAMP	24/06/93	BEFORE	PENDING
58	AMBER-GRIS CAYE	0.00	0.00	TOURISM	21/10/93	BEFORE	QUALIFIED
59	STANN CREEK CAYES (OTHER)	0.20	0.06	HOUSING PRIVATE HOLIDAY	26/10/93	BEFORE	QUALIFIED
60	BELIZE CITY	0.41	0.41	INDUSTRY	05/11/93	BEFORE	QUALIFIED
61	BELIZE CITY	0.08	0.08	INDUSTRY	08/12/93	BEFORE	QUALIFIED
62	SANTA ELENA	0.00	0.00	HOUSING COMMERCIAL PRIVATE	09/12/93	BEFORE	TRIMMING
63	BELIZE CITY	2.03	2.03	INDUSTRY	16/01/94	DURING	QUALIFIED
64	BELIZE CITY	2.03	2.03	BUSINESS	02/02/94	BEFORE	QUALIFIED
65	BELIZE CITY	2.23	0.00	HOUSING COMMERCIAL PRIVATE	21/02/94	DURING	PENDING
66	BELIZE CITY	0.04	0.04	EDUCATION	01/03/94	AFTER	QUALIFIED
67	STANN CREEK CAYES (OTHER)	0.04	0.00	HOUSING PRIVATE HOLIDAY	16/03/94	BEFORE	REFUSED
68	BELIZE CITY	0.09	0.09	HOUSING PRIVATE PRIVATE	21/03/94	BEFORE	QUALIFIED
69	STANN CREEK CAYES (OTHER)	0.81	0.00	TOURISM	22/03/94	DURING	REFUSED
70	BELIZE CITY	2.03	2.03	BUSINESS	20/04/94	BEFORE	QUALIFIED
71	CATTLE LANDING	0.14	0.14	MARINA/BOAT ACCESS	20/04/94	BEFORE	QUALIFIED
72	STANN CREEK CAYES (OTHER)	0.00	0.00	TOURISM	03/05/94	BEFORE	TRIMMING
73	BELIZE CITY	0.39	0.36	HOUSING PRIVATE PRIVATE	03/05/94	BEFORE	QUALIFIED
74	AMBER-GRIS CAYE	2.03	2.03	HOUSING COMMERCIAL HOLIDAY	03/05/94	DURING	QUALIFIED
75	BELIZE CITY	2.43	0.00	HOUSING COMMERCIAL PRIVATE	10/05/94	DURING	PENDING
76	PLACENCIA	0.20	0.00	MARINA/BOAT ACCESS	11/05/94	BEFORE	PENDING
77	CAYE CAULKER	0.04	0.04	TOURISM	13/06/94	BEFORE	QUALIFIED
78	BELIZE CITY	2.03	2.03	BUISNESS	16/06/94	BEFORE	QUALIFIED

NO.	AREA	APPLIED (ha)	GIVEN (ha)	MAIN LAND USE	APPLIED	TIMING	RESULT
79	PLACENCIA	1.01	0.84	HOUSING COMMERCIAL HOLIDAY	24/06/94	BEFORE	QUALIFIED
80	BELIZE CITY	0.41	0.41	BUSINESS	15/07/94	BEFORE	QUALIFIED
81	CAYE CAULKER	0.55	0.44	HOUSING COMMERCIAL HOLIDAY	12/08/94	DURING	QUALIFIED
82	BELIZE CITY	0.04	0.04	HOUSING PRIVATE PRIVATE	23/08/94	BEFORE	QUALIFIED
83	BELIZE CITY	0.81	0.81	BUSINESS	14/09/94	BEFORE	QUALIFIED
84	AMBER-GRIS CAYE	0.16	0.00	HOUSING COMMERCIAL HOLIDAY	15/09/94	BEFORE	PENDING
85	ST. GEORGE'S CAYE	0.04	0.00	HOUSING PRIVATE HOLIDAY	19/09/94	BEFORE	PENDING
86	BELIZE CITY	0.04	0.04	HOUSING PRIVATE PRIVATE	30/09/94	BEFORE	QUALIFIED
87	BELIZE CITY	0.41	0.41	HOUSING COMMERCIAL PRIVATE	05/10/94	BEFORE	QUALIFIED
88	BELIZE CITY	0.26	0.26	BUSINESS	10/11/94	BEFORE	QUALIFIED
89	STANN CREEK CAYES (OTHER)	0.04	0.00	TOURISM	12/11/94	BEFORE	PENDING
90	BELIZE CAYES (OTHER)	2.03	0.00	TOURISM	15/11/94	BEFORE	PENDING
91	BELIZE CAYES (OTHER)	0.00	0.00	EDUCATION	01/12/94	BEFORE	TRIMMING
92	BELIZE CITY	0.41	0.41	BUSINESS	01/12/94	BEFORE	QUALIFIED
93	PLACENCIA	0.01	0.01	MARINA/BOAT ACCESS	05/12/94	BEFORE	TRIMMING
94	BELIZE CAYES (OTHER)	0.49	0.49	TOURISM	06/12/94	DURING	QUALIFIED
95	BELIZE CAYES (OTHER)	1.22	1.22	TOURISM	06/12/94	BEFORE	QUALIFIED
96	BELIZE CAYES (OTHER)	1.22	1.22	TOURISM	06/12/94	BEFORE	QUALIFIED
97	CAYE CAULKER	0.00	0.00	MARINA/BOAT ACCESS	21/12/94	BEFORE	TRIMMING
98	BELIZE CITY	0.41	0.41	BUSINESS	26/01/95	BEFORE	QUALIFIED
99	BELIZE CITY	0.32	0.32	BUSINESS	28/01/95	BEFORE	QUALIFIED
100	STANN CREEK CAYES (OTHER)	2.84	0.81	TOURISM	01/02/95	BEFORE	QUALIFIED
101	BELIZE CITY	3.65	0.00	BUSINESS	01/02/95	BEFORE	PENDING
102	BELIZE CITY	0.41	0.41	BUSINESS	27/02/95	BEFORE	QUALIFIED
103	BELIZE CITY	0.41	0.00	HOUSING PRIVATE PRIVATE	15/03/95	BEFORE	PENDING
104	TURNEFFE ISLANDS	0.04	0.00	TOURISM	31/03/95	BEFORE	PENDING
105	TURNEFFE ISLANDS	0.81	0.00	TOURISM	31/03/95	BEFORE	PENDING

NO.	AREA	APPLIED (ha)	GIVEN (ha)	MAIN LAND USE	APPLIED	TIMING	RESULT
106	TURNEFFE ISLANDS	0.04	0.00	TOURISM	31/03/95	BEFORE	PENDING
107	BELIZE CITY	1.22	0.00	BUSINESS	16/05/95	BEFORE	PENDING
108	DANGRIGA	1.22	0.00	TOURISM	26/06/95	BEFORE	PENDING
109	TURNEFFE ISLANDS	0.10	0.00	FISHING CAMP	12/07/95	BEFORE	PENDING
110	ST. GEORGE'S CAYE	0.16	0.00	HOUSING PRIVATE HOLIDAY	26/07/95	BEFORE	PENDING

Technical Background and Results for the Analysis of Sub-division and Alien Land Holding Records

Appendix 8

This appendix describes the procedure to collate and analyse records on the sub-division of land and the buying of land by foreigners (locally referred to as aliens). It also provides the summary results of this analysis. This is the first time this information has been examined.

Sub-division Analysis

Background, Data Sources and Methodology: The National Lands Act (1981) made provision for a body to screen applications to sub-divide land. This body, the Land Utilisation Authority (LUA), was set up in 1986, administers the sub-division process and advises the Minister on whether or not each applicant should receive approval. The main source of data for this analysis was the files of the LUA consisting of agendas, meeting minutes and correspondence. The secretariat and administration of the LUA falls within the Land and Surveys Department (LSD).

The application process has two stages. First, Provisional Approval is granted after initial acceptance of the sub-division. Often, conditions are attached, such as width specifications for access roads. Increasingly, conditions also include measures to protect the environment or comply with environmental laws, including the mangrove protection regulations. The second stage is Final Approval. This is contingent on the submission of a legal survey of the new parcel layout, carried out by one of Belize's licensed surveyors. The LUA meets once a month to consider applications. Analysis therefore consisted primarily of reviewing the agendas for each meeting (a list of the applications to be considered) and the meeting minutes produced, together with the material provided by the applicant (plans, letters, application forms etc.). In this way, the progression of each application to sub-divide land was followed from the first time it was considered by the LUA to the last. The period covered by the analysis was from the LUA's start (Sept. 1986) to the end of access to LSD records (Dec. 1993).

After an initial period of familiarisation with the sub-division administration, analysis of sub-division applications and the LUA's meeting minutes was carried out during a three

month period (Sept.-Dec. 1993). Information from three different sources was used (see below). From each one, data were extracted according to the sequence shown in Figure A4. At each stage, information was entered onto database (DBase IV), using a suitable database structure that allowed each application to be assessed. With an application number as the common field, one table (with 31 fields) was set up with details of the applicant, parcel and development. A second, with nine fields, held information on the sequence of meetings at which the application was discussed. The details of the fields used are given in Table A2.

Table A2 Details of database contents for analysis of sub-division data

Applicant, development and parcel details

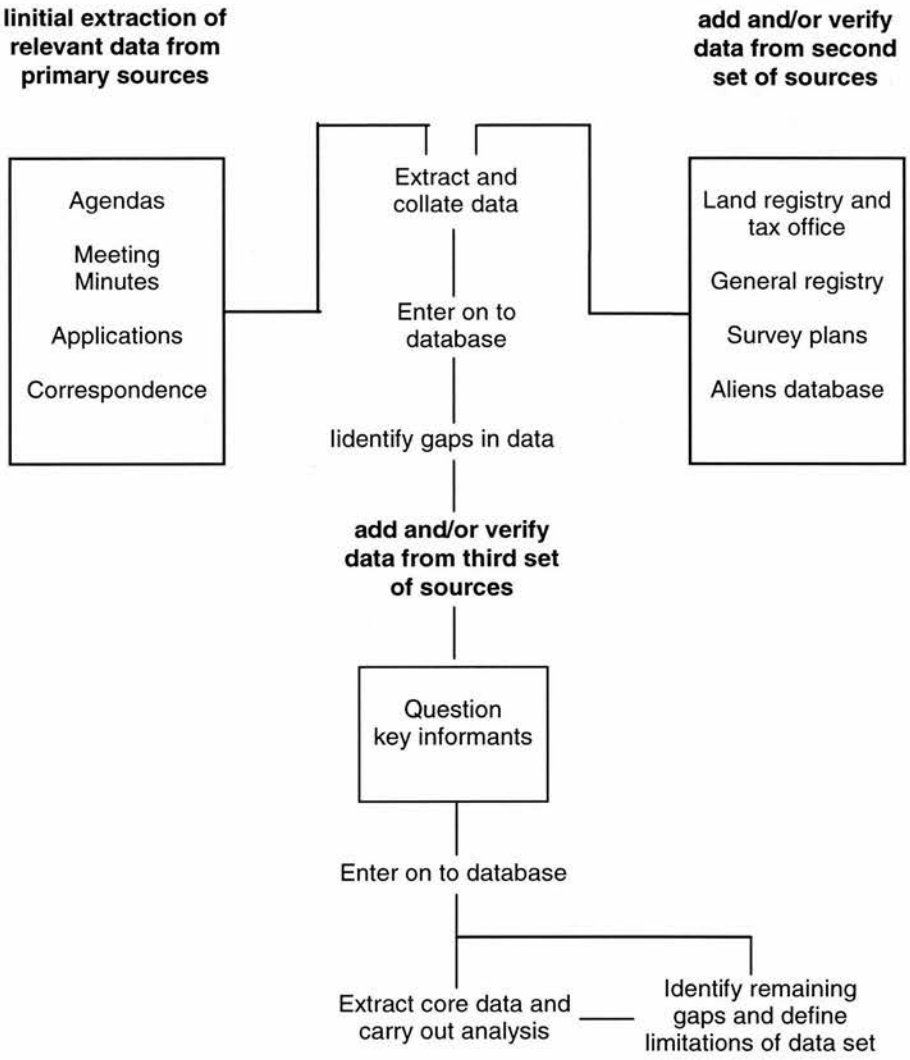
Field name	Description of field's contents
APPLIC_NO	Chronologically arranged application number (1-940)
AGENT	Applicant's agent or attorney, if used
LSTNAME	Last name of applicant
FSTNAME	First name of applicant
OTHER	Company making application
TITLE	Applicant's title (Mr. etc.)
ADDRESS	Applicant's address
NATNALITY	Applicant's nationality
VENTURE	Commercial or private development
ORIG_SIZE	Area of original parcel
SUBDIVBITS	Number of parcels being created
SITE_DESC	Description of location
DISTRICT	District in which sub-division is located
PARCEL_NO	Parcel no. in registration area (e.g. Parcel No 1845)
BLOCK_NO	Block no. in registration area (e.g. Block 16)
REG_AREA	Registration area (e.g. Caribbean Shores)
OLD_PARCEL	Previous parcel no.
OLD_ENTRY	Previous survey no.
NEW_ENTRY	New survey no.
TITLEDESC	Description of the deed title
DEED_BOOK	Deed book no. in which purchase was recorded
LAND_CERT	Land certificate number
TCT	Transfer of certificate title
GRANT	Grant no.
PURPOSE	Purpose of the sub-division (e.g. tourism, business, housing etc.)
COASTAL	Whether the area to be sub-divided is inland, on the mainland coast or cayes
MANGROVE	Whether the area to be sub-divided includes mangroves
PERMIT_CON	Requirement to obtain a mangrove alteration permit
EIA_CON	Requirement to carry out an EIA before starting the development
CONSULTED	Organisations consulted with during evaluation of application
FILENO	LSD file in which sub-division application kept

Meeting details

Field name	Description of field's contents
APPLIC_NO	Chronologically arranged application number (1-940)
REQUEST	Whether the applicant is requesting provisional or final approval
MEET_DATE	Date of the LUA meeting when application considered
MEET_NO	The number of meetings at which the application has been considered
DECISION	The LUA's decision to give or defer provisional or final approval
CONDITIONS	The conditions put on the awarding of provisional or final approval
COMMENTS	Comments on the progress or the application

From the resulting data set, a summary sub-set of the sub-divisions reaching Final Approval was extracted. This was transferred onto Excel spreadsheet and used for the analysis presented here. The resulting data are given in Table A3 at the rear of the appendix.

Figure A4 Procedure for collating and validating land ownership information from the Aliens Land Holding records



Aliens Land-holding Analysis

Provision of the Legislation: The Aliens Land Holding Ordinance requires any foreigner or foreign owned company to obtain a Ministerial licence prior to acquiring an interest in more than 10 acres in a rural area, half an acre in a town, or any size parcel within a declared area. The Ordinance has been in force since 31st Dec. 1973, and is administered by the Lands and

Survey Department of the Ministry of Natural Resources. Powers under the Ordinance lie directly with the Minister responsible for lands, who 'may in his discretion grant an alien a licence to acquire and to hold estate in land subject to such terms and conditions in the licence specified as he may deem fit for the development of the said land'. Licences and conditions may also be altered or cancelled by the Minister. All licences and cancellations also have to be recorded in the General Registry as a Deed. The Minister can designate declared areas where the purchase of all parcels, regardless of size, requires a licence. Six such areas have been created, where demand for land is high, five of which are on the coast (Table A4). The most significant of these was the 1992 declaration of all offshore cayes in 1992.

Table A4 Declared areas designated under the Aliens Land Holding Act (1973)

Statutory Instrument and Date	Site Covered	Area (ha)
No. 40 of 1975	San Pedro	97.2
No. 50 of 1978	Hopkins	91.9
	Placencia	63.2
	Caye Caulker	368.6
No. 61 of 1982	Santa Elena, Corozal *	24.7
No. 111 of 1992	Offshore Islands	36,029.8

Size of Declared Areas is taken from Statutory Instruments, apart from the following, which were derived from:-
(i) Calculated from Plan Entry 1685 combined with the area description given in the Statutory Instrument
(ii) Estimate from Land Information Centre/Coastal Zone Management Project (1995)
* Not coastal

The current total extent of declared area is 36,208.6 ha (1.6% of Belize). Of this, only 0.1% is inland and 0.4% on the mainland coast, with the remaining 99.5% covering the cayes.

The other significant criterion enshrined within the Ordinance, is the definition of an 'alien'. It defines an alien as a person or company other than:

i. a British subject born in Belize (i.e. a native Belizean);

ii. a person domiciled in Belize and who has been so domiciled for an uninterrupted period for over three years; or

iii. a company incorporated in Belize and deemed not to be under alien control (i.e. with less than half its shareholders or directors being aliens, with less than half of its votes exercisable at any company meeting being held by or on behalf of aliens, or with less than half its share capital held by or on behalf of aliens).

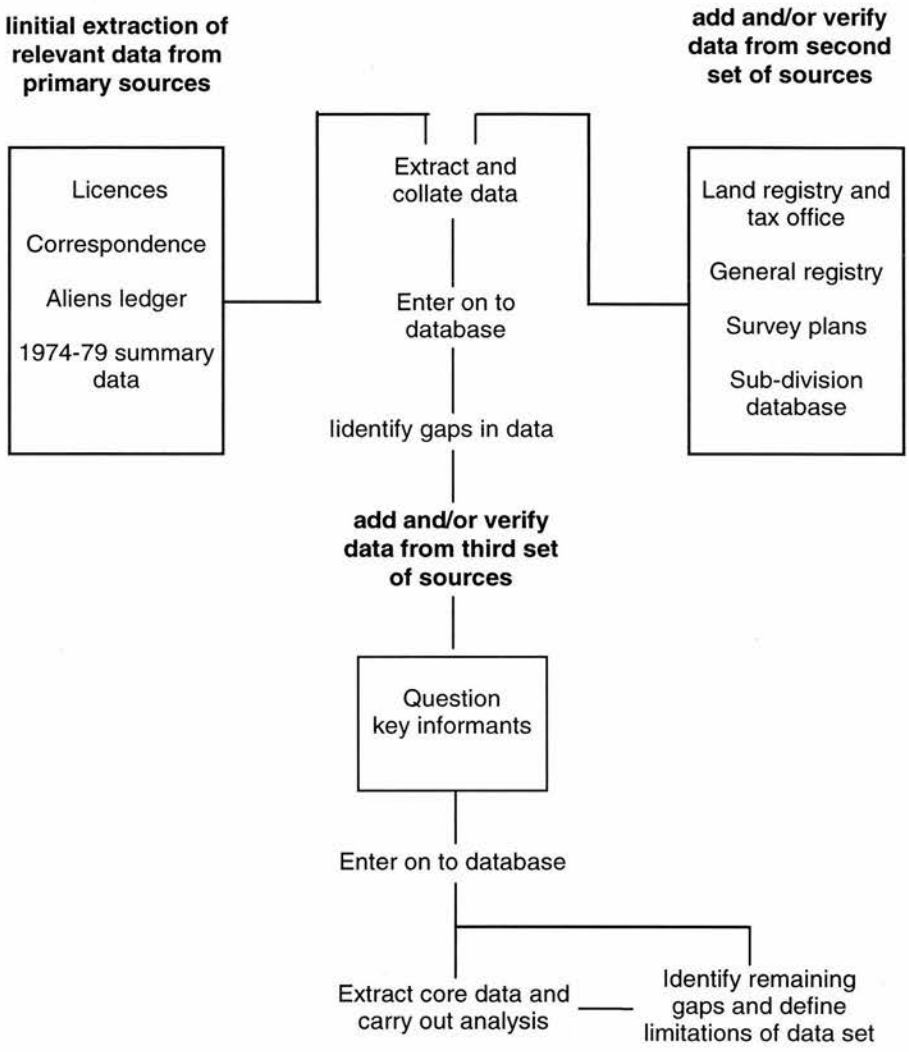
The most significant aspect to note in respect of these stipulations is the sale of Belizean citizenship, in progress since 1988. People who are essentially foreigners, but who have bought Belizean passports, therefore do not require an Aliens Land Holding Licence. This has led to an under-estimate of the land being bought by people from overseas. This is most relevant in the case of Taiwanese individuals and companies, because, according to sub-division and other evidence, they have bought substantial areas of land.

Methodology and Data Sources: Analysis was undertaken at the LSD, through the office of the Principal Lands Officer, who is responsible for administering the Ordinance on a daily basis. A pilot study was completed for 1974 and 1975, to evaluate data quality and its adequacy for desired analysis. These years were chosen because data was most incomplete so they represented a 'worst case' scenario. Results revealed a poor level of completeness for several data categories, but improvements were made by using other sources. Information was transferred on to database (DBase IV) to allow automated analysis. The data structure developed consisted of 28 fields, covering details of the applicant, the vendor and the type of development. These are listed below, in Table A5.

The data collected for this analysis were drawn from three sources. As a result, information was extracted in a sequence of stages, over a two year period. This enabled a continuous process of checking and cross-validation between sources to be carried out. The data collection procedure for the Aliens Land Holding Licences is shown in Figure A5.

Within the primary group, the main source was the licence itself, an example of which is included at the rear. Also important was correspondence held in the licence file, primarily comprising letters of application, but also, in many cases, maps showing the parcel's location. As part of the Ordinance administration, basic licence details are entered by the Principal Lands Officer into a ledger, with annotations describing any subsequent details (e.g. revisions, cancellations etc.) pertaining to the licence. This was also used. Finally for the primary data sources, and only relevant to the period 1974-79, a Lands and Surveys Department summary of aliens licences was discovered. It was used only to a limited degree as it was found to contain inconsistencies, particularly instances of double counting when adding the area licensed for purchasing.

Figure A5 **Procedure for collating and validating land ownership information from the Aliens Land Holding records**



Secondary sources were more diverse. Surveys of land parcels (either government plans or private entries) were examined for parcel areas. Various information was extracted from land tax records, and the land registry (for land within compulsory registration areas). Conveyance books contain the most comprehensive and efficiently stored data, although since they include every transaction, all purchases have to be sifted to find those for which an aliens licence was required. The Principal Lands Officer is meant to highlight in the Conveyance Books the sales where these were necessary, but this has not been the practice for several years (L. Belisle pers. comm. 1995). Company records, filed at the General Registry, were examined to determined company nationality and shareholders. Finally, the sub-division data base developed as part of this thesis, was examined to add any relevant information.

Tertiary informants were selected according to two criteria, on the basis of their knowledge of land ownership in Belize or a particular part of it, and their involvement in the administration of land transactions. Discussions were held to obtain details that had not been determined from other sources. Where time allowed, and aliens were residing in Belize, they were contacted to provide missing information.

Table A5 Details of database contents for analysis of Aliens Land Holding Data

Field name	Description of field's contents
LIC	Licence Number 76089 = 1976 licence no. 89
LIC1APPL	Date of Application
LIC1GIVEN	Date of Licence
LIC1PURCH	Date of land purchase
LU	Intended land use
LICTYPE	Licence type
AREACODE	Whether land bought before by an alien
LICLAST	Reference of previous but superseded licence by the same applicant
LICNEXT	Licence number of following licences when it is superseded
PURCHLNAME	Last name of applicant
PURCHFNAME	First name of applicant
PURCHADDBZ	Applicant's address in Belize
PURCHADDOS	Applicant's address overseas
PURCHCOMPN	Company making application
PURCHNAT	Purchaser's nationality
PURCH_ACRE	Size of parcel/s being bought
AREANOTES	Notes on parcel e.g. no. of lots being bought
SHARES	Information on shareholders
SOURCE	Information sources used (see below for codes)
LOCATION	Location of land being bought
COASTAL	N = inland, M = mainland coast, C = cayes
DISTRICT	District in which land is being bought
OTHRELOC	Any extra location information
AREAREG	Lot ... Blk .... Registration Section ....
AREAPLAN	Entry ..... Reg .....
VLNAME	Vendor's last name
VFNAME	Vendor's first name
VADDBZ	Vendor's address in Belize
VADDOS	Vendor's address overseas
VCOMPNAME	Company selling land
VCOMPADDBZ	Company's address in Belize
VCOMPADDOS	Company's address overseas
VNAT	Vendor's nationality
PRICENOTES	Incidental notes on price paid for land
CONDIVDATE	Date by which conditions have to be complied with
CONDIOTHER	Conditions
NOTES	Anything else

Limitations of data: Examination of the Ordinance's operation reveals several significant caveats that affect the quality of the data produced from licence analysis. These are as follows:-

1. Not all licences have been used. Firstly, they expire after 90 days. Delays in many land transactions meant that licences were regularly re-issued. Care therefore had to be taken to eradicate these duplicate licences.

2. In some cases, buyers do not complete their purchase, so it cannot be assumed the number and area of licences awarded precisely matches the purchasing of land by foreigners. Names consequently all have to be checked against lands records to see if the licensee went ahead with the purchase. According to real estate agents however, more that an estimated 95% of licensees go on to complete their purchase.

3. The nationality of buyers is generally not given in the licence files, and instead purchasers are listed as 'aliens'. The nationalities of purchasers and the vendors has had to be inferred from their addresses, which may not always be their nationality. In the case of oriental applicants, nationality has also been inferred from their names (i.e. Taiwanese).

4. The increasing sale of Belizean nationality to Taiwanese over 1988 or so to the present has created a group of foreign buyers who do not require a licence since they are officially Belizeans. Again this weakens the comprehensiveness of the data set.

5. Companies also need a licence when shares are being transferred between foreign shareholders. The company register is held in the Registry in Belize City, and the company files were examined to determine company nationality (from the addresses of offices, Directors, or majority shareholders), and to determine the shareholders. Each company file is meant to contain an annual return detailing shareholder names and the number of shares held. However, although these sheets were commonly present, with some further shareholder listings in the Memoranda of Association, they generally were limited to the shares held by company secretaries, solicitors and treasurers. It was therefore not possible to check whether the exchanges of shares had taken place for which Aliens Licences had been obtained. It appears that the annual returns of shareholders are not being completed comprehensively.

6. Finally, once a foreigner has lived in Belize for three years, they no longer require a licence if they buy any more land. This is particularly important because many of the

main promoters of real estate deals are foreign (e.g. Ronald Zent, Gerry McDermott, Ian Ritchie, W. Ford Young), and are therefore able to operate outside the control of this legislation.

These are the weaknesses and inconsistencies in the data set. Set against these, is the fact that the licensing system has been consistently operated over the period under study. Critically, it also provides the most practical method of identifying the changes of foreign land ownership in Belize. The data set collated also has the potential to be further refined (e.g. by linking it up to land parcel maps) and to be used for other research into land ownership in Belize. Summary data from the sub-division analysis s provided at the rear of this appendix, in Table A6.

Table A3 **Summary results from the analysis of all sub-divisions in Belize obtaining Final Approval (1986-1993)**

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
3	US	C	502.20	2	CY	AG	N	N
4	BZ	U	0.20	2	CY	HP	N	N
8	US	C	36.05	2	BZ	RT	C	Y
9	US	C	32.00	2	BZ	RT	C	Y
11	CA	C	0.49	7	CZ	RT	M	Y
18	X	C	0.41	5	BZ	HP	N	N
19	BZ	C	43.21	2	CY	O	N	N
25	BZ	P	4.54	8	CZ	HP	N	N
32	BZ	U	0.00	10	OW	U	N	N
33	X	C	279.45	3	CY	O	N	N
43	US	C	553.59	13	BZ	AG	N	N
50	X	U	174.15	2	SC	U	M	Y
55	BZ	P	1.62	3	BZ	U	C	X
60	BZ	P	0.00	0	SC	HP	N	N
63	US	C	3361.50	69	TO	A	M	Y
64	PA	C	1.17	0	BZ	HP	M	Y
67	BZ	U	5.67	2	BZ	U	N	N
69	BZ	P	46.41	11	BZ	HP	N	N
72	L	C	1.42	16	BZ	HP	M	Y
73	CA	C	21.14	0	SC	RT	M	Y
75	X	U	9.11	0	CY	U	N	N
78	BZ	U	1.26	0	BZ	HP	M	X
80	BZ	U	10.17	0	CZ	U	M	X
83	US	U	8.10	6	BZ	RT	C	Y
84	X	U	26.28	97	CZ	HP	N	N
97	BZ	C	1403.33	5	SC	U	N	N
98	US	C	10.37	64	CZ	RT	M	Y
100	US	C	2539.96	124	BZ	AG	N	N
101	BZ	C	30.09	2	CZ	U	N	N
106	BZ	C	0.00	2	BZ	HP	C	Y
116	US	C	2.03	39	BZ	RT	C	Y
119	US	C	48.60	273	BZ	RT	C	Y
120	BZ	C	2.03	2	SC	HP	N	N
121	X	U	1.74	0	BZ	U	N	N
122	BZ	C	6.93	4	BZ	HP	C	Y
125	BZ	P	8.10	10	BZ	HP	N	N
137	BZ	C	55.77	132	BZ	HP	C	Y
138	US	C	396.90	2	CY	T	N	N
140	US	C	538.65	3	BZ	T	C	Y
150	BZ	C	21.83	33	CZ	HP	N	N
151	US	C	3.52	7	SC	HP	M	Y
158	BZ	C	19.24	2	CZ	SH	M	X

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
159	ME	C	1121.85	2	OW	AG	N	N
160	ME	C	1458.00	2	OW	AG	N	N
163	BZ	U	10.13	2	CY	U	N	N
164	BZ	C	298.16	2	BZ	U	N	N
168	US	C	1.62	33	BZ	HP	C	Y
171	X	C	134.46	11	CZ	U	M	Y
173	X	U	5.67	3	TO	U	X	X
176	BZ	U	1.98	2	BZ	U	N	N
178	BZ	P	11.50	3	CZ	AG	M	X
179	BZ	C	4.05	2	CY	HP	N	N
180	CA	C	243.00	2	CZ	TR	M	X
181	X	C	169.29	468	CZ	RT	M	Y
182	BZ	C	0.00	2	CY	HP	N	N
183	BZ	U	4.09	28	CZ	HP	N	N
187	US	C	612.72	41	BZ	AG	N	N
191	X	C	7978.50	2	BZ	A	M	Y
195	X	C	0.73	2	CZ	U	M	X
201	X	C	476.69	2	CZ	AG	N	N
203	BZ	P	5.02	4	BZ	HP	N	N
206	X	C	78.98	497	CZ	RT	M	Y
207	BZ	C	0.00	0	CZ	U	N	N
209	BZ	C	0.00	0	CZ	U	N	N
210	BZ	C	1.46	31	BZ	HP	C	Y
214	BZ	C	121.38	16	TO	HP	N	N
222	X	C	2.03	5	CZ	HP	N	N
223	BZ	C	1.17	2	BZ	MB	Y	X
230	BZ	U	0.89	2	CZ	U	M	X
233	BZ	P	0.77	2	CZ	U	Y	X
235	X	C	10368.00	2	CY	AG	N	N
236	BZ	C	8.10	2	CZ	U	N	N
237	US	C	1.70	6	SC	HP	M	Y
238	US	C	1.62	6	SC	HP	M	Y
244	PA	C	120.49	0	BZ	HP	M	Y
245	BZ	C	11.54	18	CZ	I	N	N
246	TW	C	16.20	116	BZ	HP	N	N
247	US	C	3.24	24	BZ	RT	C	X
248	TW	C	4.05	2	BZ	I	N	N
249	BZ	U	0.00	2	CY	SH	N	N
252	BZ	C	0.00	0	BZ	U	N	N
253	BZ	C	8.10	74	SC	HP	N	N
257	BZ	C	16.00	7	CZ	U	M	X
260	BZ	C	0.00	2	CZ	I	N	N
261	US	C	4.70	11	SC	HP	M	Y
270	US	C	1750.41	246	CZ	RT	M	Y
271	BZ	C	2.47	2	BZ	U	N	N

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
274	PA	C	6.72	48	BZ	HP	M	Y
275	BZ	C	0.04	2	CY	HP	N	N
278	US	C	0.00	0	SC	HP	M	X
279	BZ	P	0.28	6	TO	HP	N	N
280	BZ	P	0.32	5	TO	MB	N	N
283	US	C	3.44	34	BZ	HP	C	Y
291	BZ	P	29.85	2	BZ	HP	N	N
292	BZ	C	0.00	0	CZ	AG	N	N
293	BZ	P	19.76	2	CY	MB	N	N
294	US	U	2.11	4	SC	HP	N	N
295	BZ	U	0.04	2	BZ	HP	M	N
298	BZ	U	0.28	5	CZ	HP	N	N
302	BZ	C	9.72	4	BZ	U	N	Y
304	BZ	C	8.10	4	BZ	HP	N	N
305	BZ	P	3.65	2	BZ	HP	C	X
306	BZ	U	0.08	2	BZ	U	C	X
307	BZ	C	0.45	7	CZ	HP	N	N
308	BZ	C	2.92	2	CZ	U	N	N
312	BZ	C	2.03	37	SC	HP	N	N
313	BZ	C	1.94	33	SC	HP	N	N
314	BZ	C	1.86	39	SC	HP	N	N
317	BZ	C	532.94	58	CZ	AG	N	N
318	TW	C	0.00	2	BZ	HM	M	Y
319	BZ	C	0.36	3	CY	HP	N	N
320	BZ	U	0.00	2	CY	U	N	N
322	US	C	28.51	245	BZ	HP	M	Y
323	US	C	107.33	0	CY	U	N	N
324	BZ	P	1.09	2	CY	HP	N	N
329	US	C	556.07	0	BZ	HP	N	N
331	X	U	1.05	2	BZ	HP	M	X
333	BZ	U	0.04	2	BZ	HP	M	Y
334	UK	C	0.00	4	CZ	HP	M	X
340	US	C	3.85	57	BZ	HP	C	Y
341	BZ	C	8.10	2	BZ	SH	N	N
345	BZ	C	8.10	82	CY	HP	N	N
346	BZ	P	0.32	2	CZ	HP	N	N
352	BZ	P	2.96	7	CZ	HP	N	N
353	BZ	C	20.25	2	BZ	I	N	N
356	BZ	C	32.12	3	SC	MB	N	N
360	BZ	C	2.03	5	BZ	HP	M	Y
365	BZ	P	166.86	2	CZ	U	N	N
366	BZ	P	0.00	2	BZ	HP	M	Y
368	BZ	C	4.05	30	SC	HP	N	N
369	BZ	P	0.08	2	CZ	HP	N	N
370	BZ	C	13.73	164	CY	HP	N	N

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
372	X	C	2.03	6	CY	I	N	N
374	BZ	C	0.81	2	CY	HP	N	N
376	BZ	P	1.22	2	CZ	HP	N	N
377	US	C	0.00	91	SC	HP	M	Y
379	US	C	4595.13	41	BZ	MB	N	N
380	BZ	C	0.81	17	SC	HP	M	Y
384	US	C	0.00	3	BZ	RT	C	Y
392	US	C	65.57	300	BZ	HP	N	N
393	BZ	C	4.05	2	BZ	U	M	Y
394	BZ	C	30.38	2	CY	AG	N	N
396	BZ	C	0.04	2	CZ	U	M	X
399	BZ	C	0.00	29	CY	HP	N	N
402	BZ	C	2.11	5	CZ	HP	N	N
403	BZ	C	1.62	14	CY	HP	N	N
404	BZ	U	0.12	4	SC	HP	M	X
406	BZ	P	5.87	2	CY	HP	N	N
408	BZ	C	8.02	2	CZ	AG	N	N
409	BZ	C	1.66	10	CY	HP	N	N
410	BZ	C	7.29	88	CZ	HP	N	X
412	US	C	0.00	0	CY	U	N	N
418	BZ	C	0.08	2	CY	HP	N	N
419	BZ	C	7.70	5	CY	HP	N	N
421	BZ	P	0.00	3	OW	HP	N	N
423	BZ	C	1.17	14	BZ	HP	M	Y
425	US	C	0.49	7	BZ	HP	C	N
426	BZ	C	0.00	0	BZ	HP	M	Y
432	BZ	P	15.67	4	CZ	AG	N	N
433	BZ	P	15.47	4	CZ	AG	N	N
434	BZ	C	0.00	2	CZ	AG	N	N
436	BZ	C	0.00	2	CZ	AG	N	N
438	BZ	C	10.17	3	BZ	MB	M	Y
442	ME	C	3980.30	2	OW	AG	N	N
446	BZ	P	0.57	2	CZ	HP	N	N
449	BZ	P	0.00	2	CY	U	N	N
450	BZ	C	6.28	105	CY	HP	N	N
452	BZ	C	1.22	2	CY	HP	N	N
453	BZ	U	0.00	2	CZ	U	N	N
454	X	C	72.90	3	CY	AG	N	N
455	BZ	P	5.06	6	CZ	HP	N	N
456	BZ	P	1.62	2	CZ	HP	N	N
457	BZ	P	0.20	3	CZ	HP	N	N
458	BZ	C	0.00	8	CZ	HP	N	N
459	BZ	C	0.00	4	CZ	HP	N	N
460	BZ	C	1.50	18	CZ	MB	N	N
463	US	C	30.42	2	BZ	U	N	N
465	BZ	C	0.00	9	CY	HP	N	N

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
466	CA	C	2.11	10	CZ	HP	N	N
467	SW	C	9000.32	2	CZ	T	M	Y
471	BZ	C	8.59	2	CZ	AG	N	N
480	BZ	C	141.91	2	BZ	AG	N	N
483	CA	C	0.00	3	SC	U	M	X
484	BZ	C	0.20	2	CY	HP	N	N
485	US	C	0.77	20	BZ	HP	C	X
486	US	C	405.00	38	CY	HP	N	N
487	BZ	C	1093.50	2	CY	AG	N	N
489	BZ	C	0.49	6	CZ	HP	N	N
493	BZ	P	0.04	2	BZ	HP	C	N
496	US	C	26.89	4	CY	MB	N	N
499	X	C	405.00	2	OW	U	N	N
500	BZ	C	1.54	21	CY	HP	N	N
501	BZ	C	1.09	11	CY	HP	N	N
505	BZ	P	0.12	2	BZ	HP	M	Y
509	US	C	2251.56	50	BZ	HP	N	N
510	BZ	C	0.00	14	CY	HP	N	N
512	US	U	8.10	3	BZ	U	C	Y
519	BZ	C	7.09	2	SC	MB	N	N
520	BZ	C	159.17	10	BZ	TR	N	N
526	BZ	C	1.42	8	SC	HP	M	Y
527	BZ	C	0.16	4	BZ	HP	M	Y
528	X	C	8.46	2	BZ	HP	M	Y
529	BZ	P	2.03	3	SC	HP	N	N
530	BZ	P	2.03	3	SC	HP	N	N
531	X	P	0.12	2	CZ	HP	N	N
533	BZ	C	2.75	3	CY	MB	N	N
534	BZ	C	0.00	2	BZ	AG	N	N
535	BZ	C	6.08	57	CY	HP	N	N
537	BZ	U	0.04	2	BZ	HP	M	Y
538	BZ	C	2.43	0	BZ	U	N	N
539	CA	C	8.75	10	CZ	SH	X	N
542	BZ	U	1.58	2	CZ	HP	N	N
543	BZ	P	1.74	4	SC	T	M	Y
545	BZ	P	0.36	3	BZ	HP	M	Y
546	BZ	C	17.21	110	OW	HP	N	N
547	US	P	7.29	4	TO	HP	N	N
551	BZ	C	1.22	19	CY	HP	N	N
554	BZ	P	5.47	6	CZ	HP	N	N
555	BZ	C	1.46	2	CZ	U	N	N
556	BZ	C	6.68	2	CZ	U	N	N
559	BZ	C	8.02	2	CY	T	N	N
560	BZ	U	0.04	2	BZ	HP	M	Y
562	BZ	C	8.91	109	OW	HP	N	N
564	BZ	P	0.04	2	CZ	HP	M	Y

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
575	BZ	C	0.04	2	BZ	HP	M	Y
576	X	C	8.10	50	BZ	HP	N	N
580	US	C	0.41	4	SC	T	M	Y
586	BZ	C	0.00	0	BZ	HP	M	Y
591	US	C	3.24	52	BZ	HP	C	Y
593	BZ	C	2.07	5	CY	HP	N	N
594	BZ	C	0.28	2	BZ	HP	C	Y
596	BZ	C	16.81	3	BZ	HP	N	N
599	X	C	6.20	86	CY	HP	N	N
602	BZ	C	0.00	22	CY	HP	N	N
603	BZ	C	1.78	30	BZ	HP	M	Y
604	BZ	C	38.23	4	CY	U	N	N
605	BZ	C	0.04	2	BZ	HP	C	N
608	PA	C	30.78	4	BZ	U	C	Y
610	BZ	P	4.82	6	CZ	U	N	N
613	BZ	P	0.00	3	BZ	HP	M	Y
618	US	C	78363.05	9	OW	O	N	N
619	X	U	123.53	2	CY	U	N	N
620	BZ	C	196.99	2	CZ	AG	N	N
641	BZ	C	0.00	5	CZ	HP	N	N
644	X	C	4.29	3	CZ	HP	X	X
648	X	P	4.86	2	SC	HP	Y	Y
650	BZ	P	0.32	4	BZ	HP	M	Y
656	X	C	2.19	33	BZ	HP	C	Y
658	BZ	C	0.08	2	SC	MB	N	N
662	TW	C	65.69	2	CY	U	N	N
663	TW	C	4440.02	97	CY	AG	N	N
675	BZ	P	4.05	2	CY	HP	N	N
679	X	C	1.01	0	U	U	N	N
681	BZ	C	0.20	3	CY	HP	N	N
683	US	C	180.23	2	CY	AG	N	N
686	BZ	U	10.77	2	OW	U	N	N
692	BZ	U	1.26	2	BZ	HP	N	N
694	BZ	U	0.16	2	OW	HP	N	N
699	BZ	C	0.12	2	BZ	MB	M	Y
701	BZ	P	0.04	2	BZ	HP	M	Y
702	BZ	U	4.46	2	OW	U	N	N
703	CA	C	2.84	3	CZ	RT	M	Y
707	BZ	P	41.31	3	CZ	U	N	N
713	US	C	0.00	88	SC	HP	M	Y
717	BZ	C	5.55	0	BZ	HP	M	Y
718	BZ	P	0.16	2	OW	HP	N	N
724	BZ	P	39.65	2	CZ	AG	N	N
725	BZ	C	0.16	2	CZ	O	N	N
728	BZ	C	550.80	27	CY	O	N	N
729	BZ	C	3.85	14	CY	HP	N	N

APPLIC. NO.	NATIONALITY	VENTURE	AREA (ha)	LOTS CREATED	DIST.	PURPOSE	SITE	MANGROVE
731	US	C	164.63	2	CY	HP	N	N
738	BZ	C	0.00	2	CZ	U	N	N
740	BZ	C	0.20	2	CY	HP	N	N
744	TW	C	202.50	4	CY	HP	N	N
746	TW	C	25.52	3	BZ	MB	N	N
748	BZ	C	2.63	9	CZ	HP	N	N
751	BZ	C	12.15	2	BZ	U	C	Y
753	BZ	C	4.05	5	TO	HP	N	N
754	BZ	C	10.13	91	BZ	HP	N	N
758	BZ	U	1.38	3	BZ	HP	M	Y
761	BZ	P	0.04	2	BZ	HP	M	Y
766	BZ	C	1.62	17	CY	HP	N	N
767	BZ	U	6.08	2	CY	HP	N	N
768	BZ	C	0.61	2	CY	HP	N	N
778	BZ	P	0.00	22	CZ	HP	N	N
782	BZ	P	0.04	2	SC	HP	M	N
783	BZ	C	0.65	2	CY	HP	N	N
785	UK	C	0.00	2	BZ	HP	C	Y
786	BZ	C	6.64	88	TO	HP	N	N
787	BZ	P	0.08	2	SC	HP	N	N
795	US	C	51.03	3	CY	O	N	N
808	BZ	P	3.48	2	CY	U	N	N
813	BZ	P	4.29	3	CZ	U	N	N
818	BZ	P	4.74	2	CZ	HP	M	Y
821	US	C	972.00	2	SC	U	N	N
823	BZ	P	0.77	5	CZ	HP	N	N
830	US	C	226.80	2	TO	HP	M	Y
832	BZ	C	0.28	4	CY	HP	N	N
842	BZ	C	0.00	0	SC	HP	N	N
843	BZ	C	0.00	0	SC	U	N	N
844	BZ	C	0.00	0	CY	U	N	N
845	US	C	8.10	56	BZ	HP	C	Y
846	X	C	3240.00	2	SC	AG	N	N
855	BZ	C	6.08	75	BZ	T	C	Y
871	US	C	3.69	5	CZ	RT	M	Y
876	BZ	C	105.71	2	CZ	U	M	Y
882	BZ	C	122.92	2	CZ	T	M	Y
897	BZ	U	0.08	2	SC	HP	N	N
904	X	P	6.08	2	CY	SH	N	N
906	BZ	P	0.04	2	SC	HP	N	N
912	BZ	C	0.00	2	BZ	MB	M	Y
922	BZ	C	5.31	3	CY	I	N	N

Explanatory Notes

Applic. No. **Chronological number given to each sub-division application**

Nationality **Nationality of the land owner whose land is being sub-divided**

BZ	Belize	TW	Taiwan
CA	Canada	UK	United Kingdom
L	Liberia	US	United States
ME	Mennonite	X	Unknown
SW	Switzerland		

Venture **The nature of the sub-division**

C	Commercial development
P	Private development
U	Unknown

Area **The area of the parcel being sub-divided**

Lots Created **The number of lots resulting from the sub-division**

District **Which district the parcel is in**

BZ	Belize District
CY	Cayo District
CZ	Corozal District
OW	Orange Walk District
SC	Stann Creek District
TO	Toledo District

Purpose **The purpose of the sub-division**

AG	Agriculture
HP	Housing
I	Industry
MB	Mixed residential and business
O	Other
RT	Housing (commercial for vacation or retirement home)
SH	Small holding
TR	Transport
T	Tourism
U	Unknown

Site **Where the parcel is located**

N	Inland
M	On the mainland coast
C	On the cayes
X	Unknown

Mangrove **Whether or not the site includes mangroves**

Y	Yes
N	No
X	Unknown

Table A6 **Summary results from the analysis of aliens land holding in Belize (1974-1993)**

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
74001	AG	X	N	0	0	US		25.11	N	CY
74002	AG	X	N	0	0			16854.08	X	SC
74003	X	M	N	0	0			60.75	N	CY
74004	AG	X	N	0	0			8.10	N	CY
74005	X	U	N	0	0	US		32.40	N	CY
74006	X	X	N	0	0			20.25	X	TO
74007	RFS	U	N	0	0	US	BZ	20.25	N	CY
74008	X	X	N	0	0			85.05	X	CZ
74009	X	H	S	0	0	CA	CA	0.00	N	CY
74010	X	X	N	0	0			0.00	X	X
74011	REL	X	N	0	0	US		0.00	M	BZ
74012	REL	X	N	0	0			0.28	N	CY
74013	X	X	N	0	0			25.72	N	OW
74014	AG	E	N	0	0	US		48.60	N	CY
74015	AG	U	N	0	0	US		154.08	N	SC
74016	X	X	N	0	0			39.45	N	CY
74017	AG	S	L	0	74034	US	US	32.40	N	CY
74018	AG	X	N	0	0			169.29	N	OW
74019	AG	U	N	0	0			25.52	N	BZ
74020	X	U	N	0	0	US		645.17	X	BZ
74021	AG	X	N	0	0	ME		145.80	N	OW
74022	X	X	N	0	0			0.00	X	X
74023	X	M	N	0	0			19.44	X	SC
74024	HCP	X	N	0	0	CA		21.26	X	CZ
74025	HPR	X	N	0	0	CA		11.14	X	CZ
74026	X	X	N	0	0			2169.99	X	TO
74027	AG	X	N	0	0	US		2794.50	N	BZ
74028	C	X	N	0	0	UK		0.00	N	CY
74029	EDU	M	N	0	0			7.96	X	TO
74030	AG	H	N	0	0	JA	US	0.00	X	SC
74031	AG	X	N	0	0			12.68	N	CY
74032	X	M	N	0	0	US		1130.76	X	BZ
74033	AG T	E	N	0	0			972.00	X	SC
74034	AG	U	L	74017	0	US	US	32.40	N	CY
74035	AG	X	N	0	0			2569.73	X	BZ
74036	AG I	H	N	0	0	US	CA	318.33	N	SC
74037	AG	X	N	0	0			91.13	N	CY
74038	AG	X	N	0	0			388.80	N	CY
74039	CON	U	N	0	0	GY	UK	2835.19	N	CY
74040	X	X	N	0	0			20.25	X	BZ
74041	AG	E	N	0	0			778.82	N	BZ
74042	AG	S	N	0	77010		BZ	81.00	N	CY
74043	AG	S	N	0	75059	US		109.35	X	TO
74044	AG	S	N	0	75058	US	US	2835.00	M	TO

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
74045	AG	U	N	0	0	US	US	2835.00	M	TO
74046	AG	U	N	0	0	US	US	2835.00	M	TO
74047	X	X	N	0	0			27.54	N	CY
75048	AG	U	N	0	0	US		445.50	N	BZ
75049	AG	X	N	0	0	US	BZ	910.04	N	BZ
75050	AG	X	N	0	0	US	BZ	1012.50	N	OW
75051	AG	E	N	0	0	US	BZ	810.00	N	BZ
75052	AG	U	N	0	0	US		2430.00	N	BZ
75053	RFS	U	N	0	0	US		6.46	N	BZ
75054	X	U	P	740+H 7941	0	US		778.82	X	BZ
75055	AG	X	N	0	0	US		89.91	N	CY
75056	RFS	X	N	0	0		GY	8.06	N	TO
75057	I	H	N	0	0			0.00	N	BZ
75058	AG	U	P	74044	0	US	US	2835.00	M	TO
75059	AG	U	N	74043	0	US		109.35	X	TO
75060	I	X	N	0	0			0.00	M	BZ
75061	X	U	N	0	0	US	BZ	202.50	N	BZ
75062	X	U	N	0	0	US		60.75	N	CY
75063	X	X	N	0	0			4.18	X	SC
75064	AG	U	N	0	0			6208.25	N	CY
75065	X	X	N	0	0			40.50	X	SC
75066	X	X	N	0	0	US		24.30	N	CY
75067	AG	S	N	0	80026	US	US	20.25	N	CY
75068	X	E	N	0	0	US		729.00	X	BZ
75069	X	X	N	0	0			27.14	X	CZ
75070	X	S	N	0	75081	US		1004.40	X	BZ
75071	AG CON	U	N	0	0	ES	US	3096.47	N	TO
75072	X	U	N	0	0	US		76.14	N	CY
75073	X	U	N	0	0	US	BZ	32.64	N	CY
75074	AG	U	N	0	0	US	US	89.34	N	BZ
75075	AG	U	F	0	0	US	US	89.34	N	BZ
75076	X	X	N	0	0			13.95	N	CY
75077	HCP T M	U	N	0	0			249.08	M	CZ
75078	X	X	X	0	0			0.00	X	X
75079	AG	U	N	0	0	ME		648.00	N	OW
75080	X	U	N	0	0	US		141.75	N	OW
75081	X	U	N	75070	0	US		1004.40	X	BZ
75082	X	X	N	0	0			4.77	X	BZ
75083	AG	S	N	0	76115	CI		1822.50	N	CY
75084	AGX	U	N	0	0	US		390.02	N	CY
76085		M		0	0			0.00		
76086	AG	U	N	0	0			25.30	N	CY
76087		M		0	0			0.00		
76088	X	U	N	0	0	US	US	1518.75	N	BZ
76089	AG	U	L	0	0	US	US	303.75	N	BZ
76090	AG	U	L	0	0	US	US	202.50	N	BZ
76091	X	S	N	0	86031	US		8.10	C	BZ
76092	AG	U	L	0	0	US	US	607.50	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
76093	AG	U	L	0	0	US	US	202.50	N	BZ
76094	AG	U	L	0	0	US	US	405.00	N	BZ
76095	AG	E	N	0	77026		BZ	1830.60	N	OW
76096	AG	X	N	0	0			14.18	X	BZ
76097	AG	X	N	0	0			785.30	X	OW
76098	X	H	S	0	0	US		1.22	C	SC
76099	AG	U	N	0	0			16.20	N	OW
76100		M		0	0			0.00		
76101	T	Z	S	0	0	US	US	118.67	C	BZ
76102	AG	U	N	0	0	US		145.80	N	BZ
76103	AG	E	N	0	77006			1701.00	N	SC
76104	AG	U	N	0	0	DU		6075.00	M	SC
76105	T	Z	S	0	0	US	US	4.14	C	BZ
76106	AG	X	N	0	0	DU	US	3.85	X	BZ
76107	AG	U	N	0	0		US	648.00	N	CY
76108	AG	X	L	0	0	US		648.00	N	CY
76109	AG	X	N	0	0	US	US	141.75	N	CY
76110		M		0	0			0.00		
76111	AG	X	N	0	0	HK		8.10	N	BZ
76112		M		0	0			0.00		
76113		M		0	0			0.00		
76114	AG	X	N	0	0	US	BZ	4472.42	N	OW
76115	AG	X	P	75083	0	CI	US	2632.50	N	CY
76116	AG	X	N	0	0		US	48.85	N	BZ
76117	AG	S	N	0	77007	US	US	2813.13	N	OW
76118	C	X	N	0	0	US	BZ	0.00	M	BZ
76119	AG REL	X	N	0	0	US		56.30	N	CY
76120	I	E	N	0	0	US	US	5.62	N	BZ
76121	AG	X	N	0	0	US		8.10	N	CY
76122	AG	X	N	0	0	US		16.20	N	CZ
76123	AG	X	N	0	0		BZ	8.51	N	TO
76124		M		0	0			0.00		
76125	AG	X	N	0	0			4455.00	N	CY
77001	HPH	U	N	0	0	US	US	0.11	C	BZ
77002	AG CON	X	N	0	0	US		2209.28	N	BZ
77003	AG	U	N	0	0	US	BZ	81.00	N	SC
77004	AG	U	N	0	0	US	BZ	72.90	N	TO
77005	AG	U	X	0	0		BZ	972.00	N	SC
77006	AG	S	P	76103	77006			1701.00	N	SC
77007	AG	X	P	76117	0	US	US	2813.78	N	OW
77008	AG	X	N	0	0	ME	ME	6075.00	N	OW
77009	AG	X	N	0	0	ME	ME	810.00	N	OW
77010	AG	X	P	74042	0		BZ	81.00	N	CY
77011	HPH	U	N	0	0	US	US	2.73	C	BZ
77012		M		0	0			0.00		
77013	HPH	U	N	0	0	US	US	0.32	C	BZ
77014	AG	X	L	0	0			6208.25	N	CY
77015	AG	X	N	0	0	US		16.20	N	BZ
77016	AG	U	F	0	0	US	US	405.00	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
77017	AG	U	N	0	0	US	US	211.41	N	TO
77018	AG	X	L	0	0	US		12.56	N	CY
77019	T	S	N	0	78002	US	BZ	0.41	C	BZ
77020	AG	U	N	0	0			152.69	N	BZ
77021	AG	C	N	0	0	US		2539.76	N	BZ
77022		M		0	0			0.00		
77023	AG	U	N	0	0	US		377.87	N	BZ
77024	AG	X	N	0	0	SD	US	7.70	N	CY
77025	AG	X	N	0	0		BZ	40.50	N	CY
77026	AG	S	P	0	77045		BZ	1830.60	N	OW
77027		M		0	0			0.00		
77028	AG	X	N	0	0	US	US	49.81	N	BZ
77029	AG	X	N	0	0	US	US	8.10	N	BZ
77030	AG	X	N	0	0	US	US	8.10	N	BZ
77031	AG	X	N	0	0	US	US	24.30	N	BZ
77032	AG	X	N	0	0	US	US	8.10	N	BZ
77033	AG	X	N	0	0	US	US	24.30	N	BZ
77034	AG	X	N	0	0	US	US	15.80	N	BZ
77035	AG	X	N	0	0	US	US	9.56	N	BZ
77036	AG	X	N	0	0	US	US	169.29	N	BZ
77037	AG	S	N	0	78055	US	BZ	41.54	N	CY
77038	AG	X	N	0	0	US	US	283.50	N	CY
77039	AG	E	P	0	0	US	US	2539.76	N	BZ
77040	AG	U	F	0	0	US	US	87.23	N	BZ
77041	AG EDU	U	N	0	0		US	791.37	N	CZ
77042	AG	X	N	0	0	US		9.17	X	BZ
77043	X	U	N	0	0		CA	4.86	N	BZ
77044	AG	U	N	0	0	US		190.35	N	TO
77045	AG	X	P	77026	0		BZ	1830.60	N	OW
77046	HPX	U	N	0	0	US		0.00	C	BZ
77047	AG	U	N	0	0	GY	BZ	8.10	N	TO
77048	X	X	N	0	0			11.76	N	CY
78001		M		0	0			0.00		
78002	X	X	N	77019	0	US	BZ	0.41	C	BZ
78003	X	X	N	0	0			78.57	N	CY
78004	AG	X	N	0	0	US	US	81.81	N	CY
78005		M		0	0			0.00		
78006	AG	X	P	77006	0			1913.63	N	SC
78007	AG	X	N	0	0		BZ	20.25	N	CY
78008	EDU	X	N	0	0		BZ	20.25	N	CY
78009	AG	X	N	0	0		US	53.41	N	BZ
78010	X	H	N	0	0		US	0.00	N	BZ
78011	X	H	N	0	0		US	0.00	N	BZ
78012	X	X	N	0	0		BZ	12.85	N	SC
78013	X	X	N	0	0			6.32	N	SC
78014	AG	X	N	0	0		BZ	63.18	N	OW
78015	AG	X	N	0	0		US	2537.73	N	CY
78016		M		0	0			0.00		
78017	I	X	P	0	0			5.62	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
78018	AG	H	S	0	0	BA		2543.35	N	CY
78019	AG	H	S	0	0	PA		2543.35	N	CY
78020	X	U	N	0	0	US	US	109.94	M	SC
78021		M		0	0			0.00		
78022	X	X	N	0	0		BZ	40.50	N	CY
78023		M		0	0			0.00		
78024	AG	X	N	0	0		BZ	202.50	X	SC
78025	AG	H	S	0	0	UK		0.00	N	CY
78026		M		0	0			0.00		
78027	AG	X	N	0	0	SW	ME	34.80	N	CY
78028	AG	X	N	0	0		US	16.20	N	BZ
78029	AG	X	X	0	0		US	8.10	N	BZ
78030	AG	X	X	0	0		US	24.30	N	BZ
78031	AG	X	X	0	0		US	8.10	N	BZ
78032	AG	X	X	0	0		US	32.40	N	BZ
78033		M		0	0			0.00		
78034	AG	X	N	0	0		US	8.10	N	BZ
78035	AG	E	N	0	0			238.14	N	CY
78036	X	O	X	0	0	BA	BZ	0.00	X	X
78037	AG	X	X	0	0	US		85.05	N	CY
78038	T	U	N	0	0	US		39.12	N	CY
78039	X	X	N	0	0	US		39.12	N	CY
78040	X	X	N	0	0			39.12	N	CY
78041	X	E	N	0	0	US		7836.75	M	CZ
78042	X	U	N	0	0	US	BZ	12.15	N	TO
78043		M		0	0			0.00		
78044		M		0	0			0.00		
78045	T	U	L	0	0	US	US	118.67	C	BZ
78046		M		0	0			0.00		
78047	AG	S	N	0	79035			12.53	N	BZ
78048		M		0	0			0.00		
78049	X	X	N	0	0			8.65	N	OW
78050	AG F	U	N	0	0	US	BZ	246971.84	N	OW
78051	HPX	U	N	0	0			0.00	C	BZ
78052	HPX	X	N	0	0			0.00	C	BZ
78053	AG	S	N	0	79004			23.66	N	CY
78054	TR T	X	X	0	0		US	14.58	C	BZ
78055	AG	X	P	77037	0		BZ	41.54	N	CY
78056	AG	X	N	0	0		BZ	121.50	N	CY
78057	AG	X	N	0	0	US	BZ	30.50	N	CY
78058	HPR	U	N	0	0	US	BZ	0.00	C	BZ
79001	X	H	N	0	0	US	US	219.92	C	BZ
79002	X	X	N	0	0		BZ	4.05	N	CY
79003	AG	X	N	0	0		BZ	1869.82	N	CY
79004	AG	X	P	78053	0			23.66	N	CY
79005	AG	U	N	0	0	US	US	40.50	N	SC
79006	AG	X	X	0	0		US	16.20	N	CY
79007	HCH	O	X	0	0	BA	BZ	0.00	N	CY
79008		M		0	0			0.00		

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
79009	AG	U	N	0	0	US	BZ	19.04	N	TO
79010	AG	U	N	0	0	US	BZ	12.15	N	TO
79011		M		0	0			0.00		
79012	AG	U	N	0	0	US	US	3037.50	N	TO
79013	AG	X	X	0	0			810.00	N	CY
79014	AG	X	X	0	0		US	1346.63	N	TO
79015	AG	X	X	0	0	US		8.51	X	X
79016	AG	X	X	0	0			1871.10	N	CY
79017	AG	O	P	0	0	US	US	211.41	N	TO
79018	AG	U	X	0	0			30.38	N	CY
79019	HPH	S	N	0	86008		US	0.00	C	BZ
79020	T	U	N	0	0	US	CI	34.22	C	BZ
79021		M		0	0			0.00		
79022	X	X	X	0	0		BZ	149.16	M	CZ
79023	AG	X	X	0	0			106.92	N	CY
79024	AG	X	L	0	0	CA	US	20.25	N	CY
79025	T	X	X	0	0	UK	UK	0.66	M	BZ
79026		M		0	0			0.00		
79027	AG	X	X	0	0	US	US	145.80	N	CY
79028	X	X	X	0	0		US	3.53	C	BZ
79029	AG	X	X	0	0			40.50	X	BZ
79030	X	X	N	0	0	US	US	7479.54	X	TO
79031		M		0	0			0.00		
79032	X	X	X	0	0			2091.42	N	CY
79033	T	S	N	0	80002	US	BZ	194.40	C	BZ
79034	AG	X	X	0	0			40.57	X	CZ
79035	AG	X	X	0	0		BZ	12.15	N	BZ
79036	AG	X	X	0	0	SA		23.90	N	CY
79037	EDU REL	X	X	0	0			17.19	X	BZ
79038		M		0	0			0.00		
79039	X	X	X	0	0		BZ	40.57	X	CZ
79040	MULTI	E	X	0	0		US	6138.99	M	BZ
79041	RFS	S	X	0	80004		BZ	8.10	N	TO
79042	MULTI	X	N	0	0	US	BZ	91.13	C	BZ
79043	X	X	X	0	0		BZ	1215.00	M	CZ
79044	T	H	S	0	0	US	US	0.00	C	BZ
79045	AG	H	F	0	0			3838.59	X	BZ
79046	T	Z	S	0	0		US	4.14	C	BZ
79047	C	H	S	0	0	US	US	0.00	M	BZ
79048	X	H	S	0	0	CI	US	0.00	N	CY
79049	T	H	S	0	0		US	0.00	C	BZ
79050	C	H	S	0	0	HO	HO	0.00	M	BZ
79051	C	H	S	0	0	HO	HO	0.00	M	BZ
79052	T	Z	S	0	84030	UK	UK	0.00	M	BZ
79053	C	H	S	0	0	HO	HO	0.00	M	BZ
79054	C	H	S	0	0	HO	HO	0.00	M	BZ
79055	T	Z	S	0	0	US	GY	0.00	C	BZ
79056	C	H	S	0	0		HO	0.00	M	BZ
79057	C	H	S	0	0		HO	0.00	M	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
79058	C	H	S	0	0		HO	0.00	M	BZ
80001	X	S	N	0	80043	US	BZ	10.13	C	BZ
80002	T	X	P	79033	0	US	BZ	194.40	C	BZ
80003		M		0	0			0.00		
80004	RFS	X	P	79041	0		BZ	8.10	N	TO
80005	X	X	N	0	0		BZ	0.00	C	BZ
80006	REL	S	N	0	80011		BZ	0.05	C	BZ
80007	X	X	X	0	0			30.38	N	CY
80008	AG	X	N	0	0	FR		38.48	N	SC
80009	AG	X	X	0	0		BZ	32.40	N	CY
80010	AG	X	X	0	0		BZ	20.25	N	BZ
80011	REL	X	P	80006	0		BZ	0.05	C	BZ
80012	HPX	X	X	0	0		US	0.00	C	BZ
80013	X	X	X	0	0		BZ	0.00	C	BZ
80014	X	S	F	0	81028	US	US	234.50	M	CZ
80015	AG	S	X	0	810+I24 30		BZ	17.24	N	CY
80016	AG	X	N	0	0		BZ	16.20	N	SC
80017	HPX	U	X	0	0	US		0.04	C	BZ
80018	HCP	X	X	0	0		US	0.00	C	BZ
80019	AG	X	X	0	0			86.20	N	CY
80020	HPX	X	X	0	0		US	0.00	C	BZ
80021	AG	X	X	0	0		BZ	40.50	N	CY
80022	AG	X	X	0	0		US	445.50	N	BZ
80023	AG	X	X	0	0			13.95	N	CY
80024	AG	X	X	0	0		BZ	26.30	N	CY
80025	T	S	N	0	80039	US	BZ	0.00	C	BZ
80026	AG	X	P	75067	0	US	US	20.25	N	CY
80027	HPX T	X	X	0	0			0.53	C	BZ
80028	AG	X	X	0	0			40.50	N	BZ
80029		M		0	0			0.00		
80030		M		0	0			0.00		
80031		M		0	0			0.00		
80032	REL	X	X	0	0		CA	13.82	N	BZ
80033	T	S	X	0	81016		US	0.00	C	BZ
80034	AG	U	N	0	0	US	BZ	32.40	N	TO
80035	AG	X	X	0	0		BZ	12.15	N	TO
80036		M		0	0			0.00		
80037		M		0	0			0.00		
80038	AG	E	X	0	0			550.80	N	BZ
80039	T	X	N	80025	0	US	BZ	0.00	C	BZ
80040	AG	X	X	0	0		CA	20.66	N	BZ
80041	AG	X	X	0	0		BZ	0.00	N	CY
80042		M		0	0			0.00		
80043	X	S	P	0	81022	US	BZ	12.15	C	BZ
80044	X	X	X	0	0	US	BZ	23.18	N	CY
80045	C	X	X	0	0		BZ	0.00	N	CY
80046	HCX T	H	S	0	0	US	US	0.00	C	BZ
80047	T	Z	S	0	0	US	US	4.14	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
81001	AG	X	X	0	0			8.10	M	CZ
81002	HPR	X	X	0	0			0.00	C	BZ
81003	AG	U	P	0	0	US		550.80	N	BZ
81004	AG	X	X	0	0		BZ	3.65	N	BZ
81005	HCP	M	X	0	0		US	0.00	C	BZ
81006	AG	X	X	0	0	SA	BZ	4.05	N	CY
81007	AG	X	X	0	0	US	US	2197.13	N	BZ
81008	AG	X	X	0	0	US	BZ	810.00	N	BZ
81009	AG	E	X	0	0		US	35.34	M	SC
81010	T	S	X	0	81036	UK	UK	0.00	M	BZ
81011		M		0	0			0.00		
81012	HCR HCH	S	X	0	81027			2.44	C	BZ
81013	AG	X	X	0	0			243.00	N	CY
81014	T	X	F	0	0	US	US	0.75	N	BZ
81015	T	X	F	0	0	US	US	1.12	N	BZ
81016	T	M	P	80033	0		US	0.00	C	BZ
81017	AG	S	X	0	81035			380.79	N	BZ
81018	AG	X	X	0	0			12.15	N	SC
81019	X	X	X	0	0		BZ	0.00	C	BZ
81020	HPX	X	X	0	0		US	0.02	C	BZ
81021	AG	O	P	0	0	US	US	211.41	M	TO
81022	X	S	P	80043	81039	US	BZ	12.15	C	BZ
81023	C	S	X	0	81053	US	US	4.05	X	BZ
81024	HPH	X	X	0	0	CA	BZ	0.15	C	BZ
81025	HPX	X	X	0	0		US	0.01	C	BZ
81026	AG	X	X	0	0		US	43.16	N	SC
81027	HCR HCH	X	P	81012	0			2.45	C	BZ
81028	X	X	F	80014	0	US	US	234.50	M	CZ
81029	T	X	X	0	0			0.00	C	BZ
81030	AG	X	P	80015	0		BZ	17.24	N	CY
81031		O		0	0	BA	BZ	0.00		
81032	AG	U	L	0	0	US	US	66.83	M	TO
81033	C	X	P	81023	0	US	US	4.05	X	BZ
81034	AG	X	X	0	0			5.95	N	CY
81035	AG	X	P	81017	0			380.79	N	BZ
81036	T	X	P	81010	0	UK	UK	0.00	M	BZ
81037	HCH T M	X	X	0	0	OZ	BZ	1790.91	M	BZ
81038	HCP	X	X	0	0			556.07	N	BZ
81039	X	S	P	81022	82020	US	BZ	12.15	C	BZ
81040	AG	S	X	0	0	US		41.27	N	BZ
81041	T	M	S	0	0	UK	UK	0.00	M	BZ
81042	T	H	S	0	0	UK	UK	0.00	M	BZ
81043	X	H	S	0	0	US		0.00	X	X
81044	X	H	S	0	0	US		0.00	X	X
81045	X	H	S	0	0		US	0.00	X	X
81046	X	H	S	0	0		US	0.00	X	X
81047	X	H	S	0	0	US		0.00	N	BZ
82001	AG	X	F	0	0			6.89	N	BZ
82002	T	U	L	0	0	US	US	226.80	M	TO

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
82003	HCP	S	X	0	82016		US	0.00	C	BZ
82004	HPX	X	X	0	0		BZ	0.00	M	SC
82005	AG	U	X	0	0	GR		20.25	N	CY
82006	X	X	L	0	0		US	133.65	M	TO
82007		M		0	0			0.00		
82008	HPX	X	X	0	0			0.00	C	BZ
82009	T	X	X	0	0	US	BZ	0.00	C	BZ
82010	HPX	U	N	0	0	UK	BZ	0.11	C	BZ
82011	HPX	X	X	0	0		US	0.81	C	BZ
82012	AG	X	X	0	0		BZ	16.20	N	SC
82013	AG	X	X	0	0	US	SW	12.15	N	CY
82014	HCP	U	F	0	0	US	US	0.00	C	BZ
82015	HCP	X	X	0	0			0.00	C	BZ
82016	X	X	X	82003	0		US	0.00	C	BZ
82017	C	X	X	0	0	HO	BZ	0.15	M	BZ
82018	X	X	X	0	0	US	BZ	4.86	C	BZ
82019	HPX	X	X	0	0	US		0.65	C	BZ
82020	X	X	P	0	0	US	BZ	12.15	C	BZ
82021	AG	X	P	81040	0	US		41.27	N	BZ
82022	T	X	X	0	0	UK	BZ	0.00	C	BZ
82023	AG	U	L	0	0	US	ES	3096.47	N	TO
82024		M		0	0			0.00		
82025	HPX	X	N	0	0		BZ	0.05	C	BZ
82026	HPH	U	X	0	0	US	BZ	0.07	C	BZ
82027	HPH	S	X	0	84008	US	BZ	0.00	C	BZ
82028	HPH	X	N	0	0	CA	BZ	0.00	M	SC
82029	AG	X	N	0	0	US		40.50	N	BZ
82030	AG	U	P	0	0	US	US	7836.75	M	CZ
82031	T	U	N	0	0		BZ	72.88	M	CZ
82032	HPH T	X	X	0	0	US	BZ	5.37	C	BZ
82033	AG	X	X	0	0			12.15	N	BZ
82034	HPH	X	X	0	0	US	BZ	0.04	C	BZ
82035	AG	X	X	0	0		SW	32.40	N	CY
82036	AG	X	X	0	0		BZ	1215.00	N	BZ
82037	AG	X	X	0	0		US	970.38	N	BZ
82038	AG	X	X	0	0	US	BZ	8.59	N	BZ
82039	HPX	X	X	0	0	US	BZ	0.00	C	BZ
82040	HPX	S	L	0	84005	US		0.00	C	BZ
82041	AG	X	X	0	0	DA		6.08	N	CY
82042	AG	X	X	0	0	DA	BZ	20.52	N	CY
82043	HPH	X	X	0	0	US	BZ	1.62	M	SC
82044	AG	H	S	0	0	US	US	0.00	N	SC
82045	T	H	S	0	0		US	1649.16	M	BZ
82046	T	H	S	0	0	OZ	BZ	1649.16	M	BZ
83001	T HCP	U	X	0	0	UK		1649.16	M	BZ
83002	AG	U	X	0	0	US	US	12.15	N	BZ
83003	AG T	X	X	0	0	US		16.40	N	CY
83004	AG	U	X	0	0	US	US	2197.13	N	BZ
83005	AG	U	P	0	0	US	BZ	810.00	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
83006	AG	S	X	0	0	US	US	4.05	N	CY
83007	AG	X	X	0	0	US	ME	246.24	N	CY
83008	HPX	X	X	0	0	CA		0.04	C	BZ
83009	T	X	L	0	0		US	0.44	C	BZ
83010	HPX	X	X	0	0	US		0.00	C	BZ
83011	AG	X	P	0	0		US	1715.18	N	CY
83012	AG	X	X	0	0	PA		1869.82	N	CY
83013	EDU CON	U	X	0	0	US	UK	40.10	N	SC
83014	T AG	X	X	0	0		US	757.76	M	SC
83015	T AG	S	X	0	85024		US	810.00	M	SC
83016	AG	X	X	0	0		BZ	121.50	N	CY
83017	AG	U	X	0	0			121.50	N	CY
83018	HPX	X	X	0	0		BZ	0.13	C	BZ
83019	AG	X	X	0	0	US		8.55	N	SC
83020	T M	X	L	0	0			250.96	M	CZ
83021	HPX	U	X	0	0		BZ	0.00	C	BZ
83022	AG	X	X	0	0		US	32.40	N	CY
83023	HPX	X	X	0	0		BZ	0.00	C	BZ
83024	AG	X	X	0	0			63.18	N	OW
83025	HPX	X	X	0	0	US	US	0.41	C	BZ
83026		M		0	0			0.00		
83027	HPX	X	X	0	0	US	BZ	0.00	C	BZ
83028	AG	S	X	0	85005	US	US	10.53	N	CY
83029	AG	X	N	0	0		BZ	20.25	N	BZ
83030	HPX	X	X	0	0	US		0.00	C	BZ
83031	T HCP	H	S	0	0	UK	OZ	1649.16	M	BZ
83032	AG	H	S	0	0			1869.82	N	CY
83033	AG	H	S	0	0		US	1715.18	N	CY
83034	C	H	S	0	0		HO	0.00	M	BZ
83035	I	H	S	0	0	US	US	0.00	C	BZ
83036	AG	H	S	0	0	TR	BZ	0.00	N	SC
83037	AG	M	S	0	84028	US		0.00	X	X
84001	HPX	X	X	0	0	US	BZ	0.04	C	BZ
84002	AG	X	X	0	0		BZ	0.10	M	SC
84003	X	X	L	0	0	US	US	2.73	C	BZ
84004	HPX	X	X	0	0	BM	BZ	1.88	M	CZ
84005	HPX	S	L	82020	84026	US		0.00	C	BZ
84006	AG	X	P	0	0	US		4.05	N	CY
84007	HPX	X	X	0	0	US		0.03	M	SC
84008	HPH	U	P	82027	0	US	BZ	0.00	C	BZ
84009	HPX	X	X	0	0	IT	BZ	0.22	C	BZ
84010	HPX	X	X	0	0		BZ	0.06	C	BZ
84011	RFS	E	X	0	0			8.10	X	TO
84012	RFS	U	X	0	0	SD		4.80	N	CY
84013	HPR	X	X	0	0	US		0.02	C	BZ
84014	HPX	S	X	0	84016	CA	BZ	0.00	M	SC
84015	HPX	X	X	0	0	SW	BZ	0.11	M	SC
84016	HPX	X	P	84014	0	CA	BZ	0.00	M	SC
84017	X	U	X	0	0	MN	US	35.34	M	SC

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
84018	RFS	X	X	0	0	US	BZ	20.32	N	CY
84019		M		0	0			0.00		
84020	TR	X	X	0	0	DU	BZ	0.19	M	BZ
84021	REL	U	X	0	0	US		0.00	M	BZ
84022		M		0	0			0.00		
84023		M		0	0			0.00		
84024	HPX	S	X	0	85003		BZ	20.90	N	CY
84025		M		0	0			0.00		
84026	HPX	X	L	82040	0	US		0.00	C	BZ
84027	AG	S	X	0	85044	US	US	6138.99	M	BZ
84028	AG	H	S	83037	0	US	US	0.00	X	X
84029	AG	H	S	0	0	US	US	0.00	N	SC
84030	T	Z	S	79015	86063	UK	UK	0.00	M	BZ
84031	X	H	X	0	0	US		0.00	X	X
85001	EDU	X	X	0	0		BZ	7.09	N	CY
85002	AG F	X	N	0	0	US	US	38516.31	M	CZ
85003	HPX	X	P	84024	0		BZ	20.90	N	CY
85004	HPH	X	X	0	0	US	US	0.05	C	BZ
85005	AG	X	P	83030	0	US	US	10.53	N	CY
85006	HPH	X	X	0	0	US		0.00	M	SC
85007	HCP	X	X	0	0		BZ	0.04	C	BZ
85008	HPX HCP	X	X	0	0	US	US	0.89	C	BZ
85009	AG	U	X	0	0	US	US	2697.71	N	TO
85010	AG	U	X	0	0	US	GY	22.92	N	CY
85011	X	X	X	0	0	US	BZ	0.04	M	SC
85012	X	X	X	0	0		BZ	0.04	M	SC
85013	X	X	X	0	0	US		2.43	N	CY
85014	AG F	U	L	0	0	US	US	277905.33	N	OW
85015	X	S	X	0	85022			0.00	C	BZ
85016	T	X	X	0	0			1.62	C	BZ
85017	AG	S	P	0	86010		ME	22.92	N	CY
85018	X	X	X	0	0		US	2.03	C	BZ
85019	AG	X	X	0	0		BZ	31.95	N	CY
85020	T	U	X	0	0		US	1.74	C	BZ
85021	X	X	X	0	0		US	0.00	C	BZ
85022	X	X	P	85015	0			0.00	C	BZ
85023	X	X	X	0	0	US		0.00	C	BZ
85024	AG REC	S	P	83018	86046		US	810.00	M	SC
85025	MULTI	U	X	0	91102	US	BZ	52.65	C	BZ
85026	HPX	X	X	0	0	US	US	0.14	C	BZ
85027	X	X	X	0	0	US	US	0.00	C	BZ
85028	RFS	X	X	0	0	JA	BZ	6.08	N	CY
85029	REL	X	F	84021	0	GA	US	0.00	M	BZ
85030	REL	U	N	0	0	GA	BZ	0.33	N	OW
85031	AG	S	X	0	86002	US	BZ	7290.00	N	BZ
85032	AG	S	L	0	86002	US		145.80	N	BZ
85033	HPH	X	X	0	0	CA	BZ	0.19	C	BZ
85034	RFS T	S	X	0	86058	US	BZ	20.25	N	CY
85035	AG	S	X	0	91091	US	US	134.87	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
85036	HCP T	X	X	0	0	US		40.50	N	BZ
85037	AG	X	X	0	0	TW	BZ	96.55	N	CY
85038	HPX HPC	X	X	0	0	UK	US	0.13	C	BZ
85039	T	X	X	0	0	US	US	0.00	C	BZ
85040	MULTI	S	X	0	85046	US	BZ	6.89	C	BZ
85041	AG	X	X	0	0	US		18.63	N	CY
85042	AG	X	X	0	0	TW	BZ	13.38	N	BZ
85043	AG	S	X	0	86028	US	US	4266.68	M	BZ
85044	AG	S	P	84027	86027	US	US	6138.99	M	BZ
85045	AG	U	F	0	0	US	CA	607.50	N	BZ
85046	MULTI	S	P	85040	86003	US	BZ	6.89	C	BZ
85047	HPR	X	X	0	0	US	BA	1.13	C	BZ
85048	EDU CON	S	N	0	86016	US	BZ	9.32	N	SC
86001	T	H	S	0	0	US	US	4.14	C	BZ
86002	AG	S	P	85032	86013	US	BZ	7435.80	N	CY
86003	MULTI	X	P	85046	0	US	BZ	6.89	C	BZ
86004	EDU	X	N	0	0	US	BZ	8.10	N	BZ
86005	X	S	L	0	86047	US		12.53	N	BZ
86006	X	X	X	0	0	US	US	0.00	C	BZ
86007	T	X	X	0	0	US	BZ	4.22	C	BZ
86008	HPH	X	P	79019	0			0.00	C	BZ
86009	HPH	U	X	0	0	US	BZ	0.10	C	BZ
86010	AG	X	P	85017	0		ME	22.92	N	CY
86011	HPR	X	X	0	0	US	BZ	1.22	C	BZ
86012	HPR	X	X	0	0	US	BZ	0.87	C	BZ
86013	AG	S	P	86002	89045	US	BZ	7435.80	N	CY
86014	AG	S	X	0	86044	US	US	405.00	M	CZ
86015	AG F	X	X	0	0	US	US	2123.42	N	OW
86016	T	U	X	0	0	US	CA	6.89	M	SC
86017	HPX T	U	X	0	0	US		0.90	C	BZ
86018	HCP	X	X	0	0	US		1.74	C	BZ
86019	HPX	X	X	0	0	US		2.18	C	BZ
86020	HPH	X	X	0	0	US	BZ	2.03	C	BZ
86021	HPX	X	X	0	0	US	BZ	0.10	M	SC
86022	HCP	X	X	0	0	US	BZ	0.13	M	SC
86023	HPX	X	X	0	0	US	BZ	0.05	M	SC
86024	HPX	X	X	0	0	US	BZ	0.09	M	SC
86025	X	X	X	0	0			0.00	C	BZ
86026	X	X	P	0	0			0.00	C	BZ
86027	AG	U	P	85044	0	US	US	6138.99	M	BZ
86028	AG	U	P	85043	0	US	BZ	4266.68	M	BZ
86029	HCP	X	X	0	0		CA	0.00	N	BZ
86030	AG	X	X	0	0			8.13	N	BZ
86031	X	X	P	76091	0	US		8.10	C	BZ
86032	RFS	U	N	0	0	CA	BZ	12.15	N	TO
86033	I	X	N	0	0		BZ	8.10	N	CY
86034	AG	U	N	0	0	US	BZ	7.29	N	CZ
86035	AG T	U	X	0	0	US		2147.72	N	TO
86036	HPX	U	X	0	0	UK	IT	0.04	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
86037	AG	X	X	0	0	DA	BZ	324.00	N	SC
86038	X	U	X	0	0	US	US	1.46	C	BZ
86039	AG	X	X	0	0	US	BZ	13.62	N	BZ
86040	AG	U	N	0	0	US	US	259.25	N	TO
86041	AG	U	X	0	0		BZ	79.38	X	SC
86042	AG	X	N	0	0	TW	US	21.87	N	CY
86043	AG	U	X	0	0	US	BZ	11.40	N	CY
86044	AG	X	P	86014	0	US	US	405.00	M	CZ
86045	HCP	X	N	0	0	TW		6.20	M	BZ
86046	AG	U	P	0	85024		US	810.00	M	SC
86047	X	U	L	86005	0	US		12.53	N	BZ
86048	T	X	N	0	0	US	BZ	12.15	C	BZ
86049	X	Y	S	0	0	PA		0.00	X	CZ
86050	X	Y	S	0	0	PA		0.00	X	CZ
86051	T	H	S	0	0	UK	UK	0.00	M	BZ
86052	HCP	U	X	0	0	US	US	3.24	C	BZ
86053	AG F	H	S	0	0	US	US	38516.31	M	CZ
86054	AG CON	U	X	0	0	UK		9029.88	M	CZ
86055	X	Y	S	0	0		BZ	10284.17	N	OW
86056	HPR T	X	X	0	0	US	US	4.54	M	SC
86057	AG	X	L	0	0	US	US	81.00	N	SC
86058	RFS T	S	P	85034	87037	US		20.25	N	CY
86059	HPR	X	X	0	0		BZ	0.02	C	BZ
86060	HPR	S	X	0	87013			0.00	C	BZ
86061	I	X	X	0	0	US	BZ	0.81	M	BZ
86062	T	U	L	0	0	US	US	72.90	M	TO
86063	T	H	S	84003	0	UK	UK	0.00	M	BZ
86064	RFS	S	X	0	87012	UK	BZ	22.22	N	BZ
86065	HCR	U	F	0	0	US	US	4777.38	N	OW
86066	X	S	X	0	87017			202.50	N	OW
86067	AG	U	N	0	0	US	US	405.00	N	BZ
86068	HPR	U	N	0	0	UK	BZ	0.06	C	BZ
86069	HPH	X	X	0	0			0.42	M	SC
86070	AG	X	X	0	0			47.60	N	CY
86071	REL	X	X	0	0	US	JA	5.27	N	BZ
86072	AG	S	X	0	87016	US	BZ	227.61	N	CY
86073	X	X	X	0	0		BZ	0.00	X	X
86074	X	X	X	0	0	US		12.15	X	BZ
86075	X	X	X	0	0	US	BZ	4.05	N	BZ
86076	I	H	S	0	0	PA	HO	4.05	N	BZ
86077	AG	H	S	0	0	US	US	347.09	N	CY
86078	HPX	X	X	0	0	US	BZ	0.00	C	BZ
86079	AG	H	S	0	0	DA	US	1306.13	N	TO
86080	EDU CON	X	P	85048	0	US	BZ	9.32	N	SC
87001	A T	R	X	0	0	US		7971.21	M	BZ
87002	HPR	X	X	0	0	US	BZ	0.04	C	BZ
87003	T	X	X	0	0	US	SW	32.40	N	CY
87004	AG	H	S	0	0		BZ	10284.17	N	OW
87005	X	S	X	0	87079			5.09	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
87006	C	H	S	0	0	PA	BZ	0.00	M	BZ
87007	C	H	S	0	0	PA	BZ	0.00	M	BZ
87008	HPR	X	X	0	0	US	BZ	1.15	M	SC
87009	HPX	X	X	0	0		US	0.02	C	BZ
87010	AG	X	F	0	0			12.15	N	SC
87011	HPX	X	X	0	0		BZ	0.00	M	SC
87012	RFS	U	P	86064	0	UK	BZ	22.22	N	BZ
87013	HPR	U	P	86060	0		US	0.00	C	BZ
87014	AG	U	X	0	0	US	BZ	810.00	N	OW
87015	AG	S	X	0	87071		BZ	17.16	N	CY
87016	AG	X	P	86072	0	US	US	227.61	N	CY
87017	AG	X	P	86066	0		US	202.50	N	OW
87018	HCH	U	X	0	0	US		0.94	C	BZ
87019	AG F	U	F	0	0	US	US	78309.18	N	OW
87020	AG F	X	L	0	0	US	US	78508.44	N	OW
87021	HPX	S	X	0	87065	US	US	0.00	M	SC
87022	HPR T	X	X	0	0	US		1.22	M	SC
87023	HPX	X	X	0	0		BZ	0.00	C	BZ
87024	AG	U	X	0	0	US	BZ	4.36	N	SC
87025	AG	X	X	0	0	TW	BZ	180.63	N	CY
87026	AG	X	X	0	0	JA	UK	2118.15	N	CZ
87027	RFS	U	X	0	0	US	BZ	20.25	M	SC
87028	REL	U	F	85030	0	US	US	0.00	N	X
87029	AG	X	X	0	0	US		227.61	N	CY
87030	AG	X	X	0	0	US	BZ	822.96	N	OW
87031	P	X	X	0	0	JA	US	6.75	M	BZ
87032	HPR AG	U	X	0	0			170.10	N	BZ
87033	HPX	X	L	0	0	US	UK	0.04	C	BZ
87034	AG	U	X	0	0	US	US	724.95	N	CY
87035	MULTI	S	X	0	89047	US	US	5262.17	M	CZ
87036	RFS T	X	P	86058	0	US	ME	20.25	N	CY
87037	T	H	S	0	0	US	BZ	0.00	C	SC
87038	X	H	S	0	0	US	BZ	0.00	C	SC
87039	AG T	Y	S	0	0	JA		1514.70	N	SC
87040	HPX	S	L	87048	0	US	US	0.00	C	BZ
87041	AG	Y	S	0	0			1514.70	N	SC
87042	AG	U	X	0	0	US		14.30	N	CY
87043	T	S	X	0	90070		BZ	8.10	M	SC
87044	AG	X	X	0	0	JA		1822.50	N	CZ
87045	X	S	L	0	88019	US	US	76.14	N	CY
87046	AG	H	S	84029	0	US	US	0.00	N	SC
87047	AG	U	X	0	0	US	US	3037.50	N	TO
87048	HPX	S	P	87040	87061	US	US	0.00	C	BZ
87049	AG	H	S	0	0	US	US	0.00	N	X
87050	A	X	L	0	0	US	DU	4234.28	M	SC
87051	A	X	X	0	0	US		1296.00	M	SC
87052	HPR	X	X	0	0	US	US	0.00	C	BZ
87053	AG	X	X	0	0	US	US	1920.11	N	CY
87054	I	U	X	0	0	US	BZ	20.53	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
87055	HPR	S	F	0	87066	US	US	8.10	M	SC
87056	REL	X	X	0	0	US	US	32.40	N	CY
87057	AG EDU	U	X	0	0	US	US	263.25	N	CY
87058	HCX T	U	X	0	0	US	BZ	12.15	M	CZ
87059	EDU CON	X	X	0	0	US	BZ	48.60	M	SC
87060	HPH	U	X	0	0	US	BZ	0.04	C	BZ
87061	HPX	U	P	87048	0	US	US	0.14	C	BZ
87062	I	X	N	0	0		BZ	0.00	M	BZ
87063	AG	U	X	0	0	TW	BZ	39.26	N	CY
87064	RFS	U	X	0	0	US		8.87	N	CY
87065	HPX	X	P	87021	0	US	US	0.53	M	SC
87066	HPR	X	F	87055	0	US	US	8.10	M	SC
87067	HPX	X	X	0	0	US		0.75	C	BZ
87068	AG	S	L	0	91057	US	US	7836.75	M	CZ
87069	EDU REL	U	X	0	0	US		4.05	N	CY
87070	AG	X	F	0	0	US	US	127.17	N	CY
87071	AG	U	P	87015	0	US	BZ	17.16	N	CY
87072	EDU CON	X	X	0	0	US		40.50	N	CY
87073	AG	X	X	0	0		BZ	19.03	N	TO
87074	A	S	X	0	88013	US	US	889.79	M	SC
87075	A	S	F	0	88015	US	US	1555.20	X	SC
87076	AG	S	X	0	88012	DA	US	116.24	X	SC
87077	AG	S	F	0	88014	US	US	1073.25	X	SC
87078	AG	X	X	0	0	DA	BZ	461.70	N	SC
87079	RFS	U	P	87005	0	UK		5.10	N	BZ
87080	X	S	X	0	88050	CA	BZ	142.69	N	CY
87081	HPR	X	X	0	0	US		0.20	C	BZ
87082	HCH	X	X	0	0	US		0.00	C	BZ
87083	C	X	X	0	0	PA		0.00	M	BZ
88001	X	X	X	0	0			4.09	N	CY
88002	T	U	X	0	0	US		0.00	C	BZ
88083	HPR T	X	X	0	0	US		2.03	M	SC
88004	HCH	X	L	0	0	US	US	0.94	C	BZ
88005	REL	X	X	0	0	US		16.20	N	CY
88006	RFS	U	X	0	0	UK	ME	14.56	N	CY
88007	X	X	X	0	0		BZ	8.74	X	CZ
88008	X	U	X	0	0	US	UK	8.10	N	CY
88009	X	X	X	0	0		BZ	1710.64	N	CY
88010	CON	U	X	0	0	US	BZ	47943.90	N	OW
88011	X	H	S	0	0			0.00	N	BZ
88012	AG	U	P	87076	0	DA	US	116.24	N	SC
88013	A	U	P	87074	0	US	US	889.79	M	SC
88014	AG	U	F	87077	0	US	US	1073.25	X	SC
88015	A	U	P	87075	0		US	1555.20	M	SC
88016	X	U	X	0	0	US		246.24	N	CY
88017	X	X	X	0	0		BZ	0.00	C	BZ
88018	AG	U	X	0	0	US		44.41	N	CY
88019	X	S	L	87045	89069		US	76.14	N	CY
88020	AG	U	X	0	0	US	BZ	37.86	N	CY

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
88021	X	U	L	0	0	US	US	0.00	C	BZ
88022	X	X	X	0	0			0.00	C	BZ
88023	HPX	S	L	0	89006	US		0.00	C	BZ
88024	X	X	X	0	0		UK	33.21	N	CY
88025	X	X	L	0	0			0.00	C	BZ
88026	X	S	X	0	88049		BZ	36.45	N	BZ
88027	AG	X	X	0	0			230.55	N	OW
88028	X	X	X	0	0	TW		7.69	N	CY
88029	HCP	E	X	0	0	US	US	383.94	M	BZ
88030	X	X	X	0	0	UK	US	11.34	M	BZ
88031	HCP	U	X	0	0	US		3234.74	N	BZ
88032	X	X	X	0	0			5.22	N	SC
88033	X	X	X	0	0		US	37.63	N	CY
88034	X	E	X	0	0	CH	BZ	92.19	N	CY
88035	X	X	X	0	0	CH		19.04	X	BZ
88036	X	X	X	0	0	CH	US	347.09	N	CY
88037	X	U	X	0	0	CH		1215.00	N	CY
88038	C	U	X	0	0	HO	US	0.00	C	BZ
88039	T	X	X	0	0	US		0.00	C	BZ
88040	X	U	X	0	0			8.10	N	CY
88041	X	U	X	0	0		BZ	17.42	N	BZ
88042	C	X	X	0	0	HO		0.06	M	BZ
88043	C	X	X	0	0	HO	US	0.00	C	BZ
88044	X	X	X	0	0			32.00	X	SC
88045	X	S	X	0	88047	TW		20.25	N	OW
88046	RFS	X	X	0	0	US	BZ	14.42	N	CY
88047	X	X	P	88045	0	TW		20.25	N	OW
88048	C	S	X	0	89048	US	US	0.02	C	BZ
88049	X	S	P	88026	89001		BZ	36.45	N	BZ
88050	AG	S	P	87080	92045	CA	BZ	78.77	N	CY
88051	RFS	X	X	0	0		US	20.25	X	SC
88052	X	X	X	0	0		BZ	0.00	M	BZ
88053	X	X	X	0	0	US	BZ	41.72	N	CY
88054	X	X	X	0	0	US	BZ	33.21	N	CY
88055	AG	U	X	0	0	US	BZ	231.26	N	CY
88056	X	S	X	0	89043		US	0.00	C	BZ
88057	X	E	X	0	0		BZ	19.04	N	TO
88058	X	X	X	0	0			40.50	X	CZ
88059	X	S	X	0	91040	CA	CA	162.00	M	SC
88060	T	H	S	0	0	UK	UK	0.00	M	BZ
88061	HCP	S	X	0	89015	US	US	267.30	M	SC
88062	X	X	X	0	0			40.50	N	CY
88063	X	X	X	0	0		BZ	0.00	C	BZ
88064	X	X	X	0	0		US	34.80	N	CY
88065	X	X	X	0	0		BZ	0.00	C	BZ
88066	X	X	X	0	0		BZ	405.00	N	CY
88067	C	H	S	0	0	HO	HO	0.00	M	BZ
88068	AG	S	X	0	89017	DA	BZ	567.00	N	SC
88069	AG	X	X	0	0			155.94	N	OW

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
89001	X	X	P	88049	0		BZ	36.45	N	BZ
89002	X	H	S	0	0			0.00	X	BZ
89003	AG F	Z	S	0	0	US	US	3178.04	N	BZ
89004	T	X	X	0	0	US	US	10.53	C	BZ
89005	T	S	N	0	90123	US	BZ	22.28	M	SC
89006	HPX	U	L	88023	0	US		0.00	C	BZ
89007	X	X	X	0	0		BZ	0.00	N	CZ
89008	X	X	X	0	0		BZ	4.89	M	SC
89009	T	X	X	0	0	UK		1.81	M	BZ
89010	X	X	X	0	0		BZ	16.20	N	CZ
89011	X	X	X	0	0			0.00	C	BZ
89012	X	X	X	0	0	US		0.06	M	SC
89013	EDU	E	X	0	0	TZ	BZ	0.00	N	CY
89014	X	X	X	0	0			36.57	N	CY
89015	HCP	X	P	88061	0	US	US	267.30	M	SC
89016	HCP	U	X	0	0	US	BZ	3234.74	N	BZ
89017	AG	X	P	88068	0	DA	BZ	567.00	N	SC
89018	I	X	N	0	0		BZ	0.68	M	BZ
89019	AG	S	X	0	89044	US		1336.50	M	CZ
89020	X	X	X	0	0	US	US	0.00	C	BZ
89021	AG	X	X	0	0			47.60	N	CY
89022	X	X	X	0	0			2.03	M	SC
89023	AG	U	X	0	0	US	BZ	17.80	N	BZ
89024	AG	X	X	0	0	US		103.28	N	CY
89025	X	X	X	0	0		JA	36.45	N	CY
89026	X	X	X	0	0			21.47	X	CZ
89027	T	U	F	78045	0	US	US	103.88	C	BZ
89028	X	X	L	0	0		UK	0.00	C	BZ
89029	AG	X	L	0	0			2813.13	X	OW
89030	X	U	X	0	0	AS	BZ	11.46	N	CY
89031	X	X	X	0	0	US	BZ	1.60	C	BZ
89032	X	E	L	0	0		TW	1215.00	N	CY
89033	X	U	X	0	0	US		4.82	N	CY
89034	AG	S	N	0	90031		BZ	259.20	N	TO
89035	X	X	X	0	0	US	US	2430.00	M	BZ
89036	X	U	X	0	0		BZ	18.76	N	CY
89037	X	X	X	0	0		BZ	9.32	N	CY
89038	X	X	X	0	0			0.00	C	BZ
89039	X	U	X	0	0	US	BZ	4.49	N	CY
89040	X	S	X	0	89074	TW	US	12.15	N	BZ
89041	X	Z	S	0	0	US	US	0.00	C	BZ
89042	X	S	X	0	89073	TW	BZ	16.51	N	BZ
89043	X	U	P	88056	0		US	0.00	C	BZ
89044	AG	X	P	89019	0	US		1336.50	M	CZ
89045	AG	X	P	86013	0	US	BZ	7290.00	N	BZ
89046	AG	U	P	86013	0	US	US	145.80	N	BZ
89047	MULTI	X	P	87035	0	US	US	5262.17	M	CZ
89048	C	U	P	88048	0	US	BZ	0.02	C	BZ
89049	AG	S	X	0	89079	US	BZ	101.25	N	CY

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
89050	AG	U	X	0	0	GA	BZ	710.37	N	SC
89051	REL	X	X	0	0			170.10	N	BZ
89052	AG	U	X	0	0	UK	BZ	1822.50	X	SC
89053	AG	S	X	0	89055		US	64.80	N	CY
89054	AG	X	L	0	0	UK	US	4657.50	N	SC
89055	AG	U	P	89053	0		US	64.80	N	CY
89056	HXX	S	L	0	90073		UK	0.18	C	BZ
89057	AG	U	F	0	0	US	US	36.45	N	TO
89058	HPX	U	X	0	0	CA	CA	0.00	C	BZ
89089	T	S	N	0	90035	US	BZ	4.32	M	TO
89060	X	X	X	0	0		BZ	1.13	M	BZ
89061	X	U	X	0	0	TW		41.27	N	BZ
89062	X	X	X	0	0	US	BZ	0.00	N	BZ
89063	X	X	X	0	0		BZ	0.00	C	BZ
89064	X	X	L	0	0			8.10	C	BZ
89065	X	S	X	0	90108			0.00	C	BZ
89066	CON	U	X	0	0		US	60.75	N	TO
89067	X	X	X	0	0		BZ	1.01	M	BZ
89068	AG	U	X	0	0	US	US	3741.39	N	CY
89069	X	U	P	88019	0	US	US	75.74	N	CY
89070	X	U	X	0	0	TW	BZ	162.00	N	BZ
89071	HPH	U	X	0	0	CI	BZ	21.06	C	BZ
89072	CON	U	L	0	0	SW	UK	8100.00	M	CZ
89073	X	X	P	89042	0	TW	BZ	1.93	N	BZ
89074	X	X	P	89040	0	TW	US	12.15	N	BZ
89075	X	X	X	0	0			5.22	N	SC
89076	X	U	X	0	0	US	BZ	4.32	N	CY
89077	X	X	X	0	0			0.00	N	SC
89078	X	X	X	0	0			446.72	M	BZ
89079	AG	X	P	89049	0	US	BZ	101.25	N	CY
89080	X	X	X	0	0		BZ	59.94	N	TO
89081	X	X	X	0	0			0.20	C	BZ
90001	AG	U	X	0	0	US	BZ	39.44	N	CY
90002	T	X	X	0	0	US	US	17.42	C	BZ
90003	X	U	X	0	0	US	US	21.34	N	OW
90004	X	U	X	0	0	US	US	8.10	N	OW
90005	X	U	X	0	0	US	US	31.52	N	OW
90006	X	U	X	0	0	US	US	8.10	N	OW
90007	X	U	X	0	0	US	US	10.08	N	OW
90008	X	X	X	0	0		US	8.10	N	BZ
90009	HXX	U	X	0	0	US	US	1.00	M	SC
90010	T	U	N	0	0	US		8.91	C	BZ
90011	P	X	X	0	0		BZ	1.01	M	BZ
90012	HCP	U	X	0	0	US	US	0.09	C	BZ
90013	HPR	U	X	0	0	US	US	0.29	C	BZ
90014	AG F T	U	L	0	0	US	US	38500.11	M	CZ
90015	X	X	X	0	0		FR	5.27	C	BZ
90016	X	X	X	0	0		BZ	40.50	N	CY
90017	X	X	X	0	0	CA	BZ	0.00	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
90018	AG P	X	X	0	0	UK	BZ	11.34	M	SC
90019	AG	S	X	0	91003	US	BZ	10.49	N	OW
90020	AG	U	X	0	0	CA	BZ	49.84	N	CY
90021	X	U	X	0	0	US		8.10	N	BZ
90022	HPH	U	X	0	0	US	US	0.01	C	BZ
90023	REL	U	X	0	0	US		13.45	N	CY
90024	AG	X	L	0	0	US	US	40.10	N	SC
90025	AG T	U	X	0	0	US	US	5.71	N	CY
90026	X	U	X	0	0		BZ	8.97	N	CY
90027	T	S	X	0	91047	US	US	2.03	M	BZ
90028	X	U	X	0	0	US		10.13	N	BZ
90029	AG	U	X	0	0	ME	US	10327.50	N	OW
90030	X	U	X	0	0	DA		32.40	N	CY
90031	AG	U	N	0	0		BZ	259.20	N	TO
90032	AG	Y	L	0	0	UK	US	0.00	N	TO
90033	X	U	X	0	0	US	US	8.10	N	CY
90034	AG	H	X	0	0	US		0.00	N	CY
90035	T	U	N	89089	0	US	BZ	4.32	M	TO
90036	X	U	X	0	0	US		11.14	N	CY
90037	I	U	L	0	0	US	US	19.01	N	BZ
90038	AG T	E	X	0	0	US	BZ	53.17	N	CY
90039	HPX	X	X	0	0		US	0.01	C	BZ
90040	HPX	X	X	0	0		US	0.01	C	BZ
90041	HPX	X	X	0	0		US	0.01	C	BZ
90042	X	U	X	0	0	US		78.98	N	CY
90043	HPX	X	X	0	0		US	0.01	C	BZ
90044	HPX	X	X	0	0		US	0.01	C	BZ
90045	HPX	X	X	0	0		US	0.01	C	BZ
90046	HPX	X	X	0	0		US	0.01	C	BZ
90047	HPX	X	X	0	0		US	0.01	C	BZ
90048	HPX	X	X	0	0		US	0.01	C	BZ
90049	HPX	X	X	0	0		US	0.01	C	BZ
90050	HPX	X	X	0	0		US	0.01	C	BZ
90051	HPX	U	X	0	0	US	US	0.01	C	BZ
90052	HPX	X	X	0	0		US	0.01	C	BZ
90053	HPX	X	X	0	0		US	0.01	C	BZ
90054	HPX	X	X	0	0		US	0.01	C	BZ
90055	HPX	X	X	0	0		US	0.01	C	BZ
90056	X	U	X	0	0	US	BZ	8.57	N	CY
90057	AG	X	X	0	0	CA	HO	109.35	N	TO
90058	HCP	U	X	0	0	US	US	3.34	C	BZ
90059	HCP	U	X	0	0	US	US	3.87	C	BZ
90060	X	U	X	0	0	US		0.00	N	CY
90061	X	X	X	0	0			0.00	C	BZ
90062	HPH AG	N	X	0	0	US	US	41.19	N	OW
90063	X	N	X	0	0		US	40.50	N	OW
90064	X	X	X	0	0		US	450.06	N	BZ
90065	X	U	X	0	0			1474.20	N	CY
90066	AG	S	X	0	91021	US	BZ	60.25	N	CY

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
90067				0	0			0.00		
90068				0	0			0.00		
90069				0	0			0.00		
90070	T	U	X	87043	0		BZ	8.10	M	SC
90071	RFS	U	X	0	0	UK	BZ	7.45	N	CZ
90072	EDU CON	U	X	0	0	US		0.00	C	SC
90073	HXX	S	L	89056	90082		UK	0.18	C	BZ
90074				0	0			0.00		
90075				0	0			0.00		
90076				0	0			0.00		
90077				0	0			0.00		
90078	X	X	X	0	0	TW	IN	202.50	N	OW
90079	X	X	X	0	0	TW	TW	18.78	N	OW
90080				0	0			0.00		
90081				0	0			0.00		
90082	HXX	U	L	90073	0		UK	0.18	C	BZ
90083	X	U	X	0	0		US	20.25	N	CY
90084	AG P	H	X	0	0	UK	BZ	0.00	M	SC
90085	X	X	X	0	0	US	US	0.00	C	BZ
90086	HPH	U	X	0	0	US	US	0.01	C	BZ
90087	HPH	U	X	0	0	US	US	0.01	C	BZ
90088	HPH	S	X	0	92006	CA	US	0.01	C	BZ
90089	EDU CON	S	X	0	91019	US	US	29.57	N	BZ
90090	HPH	U	X	0	0	US	US	0.01	C	BZ
90091	HPX	S	X	0	91030	US	US	0.00	C	BZ
90092				0	0			0.00		
90093	X	U	X	0	0	CA		22.66	N	BZ
90094	AG	X	X	0	0		BZ	16.20	X	CZ
90095	AG	S	X	0	92012	US	BZ	76.68	N	CY
90096	AG	U	F	0	0	US	US	724.95	N	CY
90097	RFS	U	X	0	0	US	IR	7.90	N	CY
90098	AG	U	L	79036	0	US	US	12.15	N	TO
90099	HPH	U	X	0	0	US	US	0.01	C	BZ
90100	AG	U	N	0	0	US	US	2569.64	N	BZ
90101	AG T	U	N	0	0	TW	US	1194.64	N	BZ
90102	AG	U	X	0	0		BZ	245.69	N	BZ
90103	T	H	X	0	0	US	US	6.48	C	BZ
90104	T	H	X	0	0	US	US	6.48	C	BZ
90105	T	H	X	0	0	US	US	6.48	C	BZ
90106	AG	S	X	0	90131	CA	BZ	120.38	N	CY
90107	T	Y	X	0	0	US	US	6.48	C	BZ
90108	HXX	U	X	89065	0	US		0.10	C	BZ
90109	T	H	X	0	0	US	US	6.48	C	BZ
90110	RFS	U	X	0	0	US		13.92	X	TO
90111	HPH AG	U	X	0	0	TW	US	121.50	N	OW
90112	HPH AG	U	X	0	0	HK	US	48.82	N	BZ
90113	HPH AG	U	X	0	0	US	US	17.83	N	BZ
90114	AG	H	X	0	0	US		0.00	N	CY
90115	HPH AG	X	X	0	0	TW	US	40.50	N	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
90116	HPX	E	X	0	0		US	0.01	C	BZ
90117	T	U	X	0	0	JP	US	0.02	C	BZ
90118	HPH	X	X	0	0	US	US	0.14	C	BZ
90119	AG	X	X	0	0			0.00		
90120	HPH	X	X	0	0	US	SW	0.00	C	BZ
90121				0	0			0.00		
90122	I	S	X	0	91010	TW	BZ	10.13	N	BZ
90123	T	S	N	89005	91059	US	BZ	22.28	M	SC
90124	HPH	X	X	0	0	JP	BZ	0.00	C	BZ
90125	REL	X	X	0	0	US		170.10	N	BZ
90126	AG F	U	X	0	0	US	US	2826.90	M	TO
90127	RFS	U	X	0	0	US	US	11.04	N	OW
90128	RFS CON	X	X	0	0		BZ	12.15	N	CY
90129	RFS	S	X	0	91039	US	BZ	32.40	N	CY
90130	AG	X	X	0	0	US	US	46.58	N	CY
90131	AG	S	X	90106	91006			120.38	N	CY
90132	X	X	X	0	0	US		13.90	N	OW
90133	AG	U	X	0	0	DA	BZ	121.50	N	TO
90134	AG	X	X	0	0	CA	US	12.15	N	TO
91001	AG EDU	U	X	0	0	US	BZ	40.66	N	CY
91002	AG	S	X	0	91024	US		988.20	N	CY
91003	AG	S	P	90019	91066	US	BZ	10.49	N	OW
91004	T	E	L	0	0	US	US	12.15	N	TO
91005	AG	X	X	90096	0	US		0.00		
91006	AG	X	X	90131	0	US	BZ	120.38	N	CY
91007	HPR	X	X	0	0	US	US	0.06	C	BZ
91008	C	H	S	0	0		HO	0.27	M	BZ
91009	HCP	U	F	0	0	TC	US	0.01	C	BZ
91010	I	X	X	90122	0		BZ	10.13	N	BZ
91011	T	U	N	0	0	CA	BZ	4.05	C	BZ
91012	T	X	X	0	0	US	US	1.22	C	BZ
91013	HPR	U	X	0	0	US	US	0.05	C	BZ
91014	T	U	X	0	0		JA	25.79	M	CZ
91015	HCP	X	X	0	0	US	BZ	1.82	C	BZ
91016	HCP	X	X	0	0	US	BZ	1.82	C	BZ
91017	HPX	X	X	0	0	US	US	0.17	C	BZ
91018	AG	U	F	0	0	US	US	25.92	N	CY
91019	EDU CON	X	P	90089	0	US	US	29.57	N	BZ
91020	C	U	N	0	0	HO	BZ	0.07	C	BZ
91021	AG	X	P	90066	0	US	BZ	69.32	N	CY
91022	AG T	X	X	0	0	TW	PA	1012.50	N	BZ
91023	C	H	S	0	0	HO	HO	0.00	M	BZ
91024	AG	X	X	91002	0			2511.00	N	CY
91025	HPX	U	X	0	0	US	BZ	29.16	N	CY
91026	HPX	U	X	0	0	US	SW	0.11	M	SC
91027	HPR	U	X	0	0	BD	US	10.13	M	BZ
91028	HPX	X	X	0	0	US	US	0.06	C	BZ
91029	HPX	X	X	0	0	US	US	0.21	C	BZ
91030	HPX	U	P	90091	0	US		0.00	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
91031				0	0			0.00		
91032	HPX	U	N	0	0	US	BZ	0.47	C	BZ
91033	HPR	S	X	0	91055		US	0.09	C	BZ
91034	C	H	S	0	0	HO	HO	0.13	M	BZ
91035	AG	E	X	0	0			25.52	N	TO
91036	HPR	U	X	0	0	US	UK	1.42	C	BZ
91037	AG	X	F	0	0	US	US	1944.41	M	SC
91038	AG HPX	X	F	0	0	US	US	12.96	M	SC
91039	RFS	X	X	90129	0	US	BZ	32.40	N	CY
91040	HCX	X	P	88059	0	CA	CA	162.00	M	SC
91041	C	X	X	0	0	US		0.25	M	CZ
91042	AG HPH	U	X	0	0	US	BZ	7.96	M	TO
91043	AG	H	S	0	0	US	US	0.00	N	CY
91044	AG	U	X	0	0	US	BZ	35.24	N	OW
91045	A	U	X	0	0	US	BZ	378.27	M	SC
91046	HPR AG	U	X	0	0	TW	BZ	16.20	N	BZ
91047	AG	X	X	0	0	US	BZ	28.35	N	CY
91047	T F	H	S	0	0	US	US	7292.03	M	BZ
91048	T	Y	S	0	0	US	BZ	6.48	C	BZ
91049	AG	U	X	0	0	US	US	390.02	N	CY
91050	HCP T	E	X	0	0	US	BZ	6.79	N	CY
91051	AG	X	X	0	0	US	BZ	40.18	N	SC
91052	T	X	N	0	0	US	BZ	10.48	C	BZ
91053	TR	U	X	0	0	DU	BZ	0.47	M	BZ
91054	RFS	U	X	0	0	US	BZ	7.99	X	CZ
91055	HPR	X	P	91033	0		US	0.09	C	BZ
91056	T HCP	S	X	0	92034	US		0.30	C	BZ
91057	AG	X	P	87068	0	US	US	7836.75	M	CZ
91058	AG	U		0	0	US	BZ	76.22	N	CY
91059	T	X	N	90123	0	US	BZ	22.28	M	SC
91060	AG	U	X	0	0	CA	BZ	175.63	N	CY
91061	AG	U	X	0	0	US		40.91	N	CY
91062	HPH	X	X	0	0	US		0.00	C	BZ
91063	HPH	S	X	0	93118	US	US	1.25	C	BZ
91064	HPH	X	X	0	0	CA	US	0.00	C	BZ
91065	AG	X	X	0	0	TW	BZ	20.84	N	BZ
91066	AG	U	P	91003	0	US	BZ	10.49	N	OW
91067	HPH	X	X	0	0	CA	US	1.11	C	BZ
91068	HPR	X	X	0	0	US	US	0.00	C	BZ
91069	HCP	U	X	0	0	US	US	1.54	C	BZ
91070	RFS	X	X	0	0	US		18.23	N	CZ
91071	HPX	U	X	0	0	US	US	0.06	C	BZ
91072	HXX	U	X	0	0	US	US	0.00	C	BZ
91073	HXX	U	X	0	0	US	US	0.07	C	BZ
91074	HPX	U	X	0	0	US	US	0.05	C	BZ
91075	HPX	U	X	0	0	US	US	0.05	C	BZ
91076	HPX	U	X	0	0	US	US	0.06	C	BZ
91077	HPX	X	X	0	0	US	US	0.00	C	BZ
91078	HXX	U	X	0	0	US	US	0.05	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
91079	X	U	X	0	0	US	US	0.05	C	BZ
91080	AG CON	S	X	0	92005	UK	BZ	17.21	N	TO
91081	AG	X	N	0	0	US	BZ	16.61	X	CZ
91082	T	S	X	0	93010	PA	BZ	29.91	C	BZ
91083	T	H	S	0	0	US		0.00	X	X
91084	AG	X	F	0	0	US	US	17.80	N	BZ
91085	T	X	X	0	0	US	US	3.24	C	BZ
91018	HCX	X	X	0	0	CA	BZ	0.46	M	BZ
91087	REL AG	U	X	0	0	US	BZ	6.08	N	CY
91088	HPH	U	X	91036	0	US		1.42	C	BZ
91089	HPX	U	F	0	0			0.03	C	BZ
91091	T	U	L	0	0	UK	GY	121.50	N	CY
91091	AG	S	P	85035	92011	US		134.87	N	BZ
91092	HPR	S	X	0	92026	TC	US	0.01	C	BZ
91093	AG	U	X	0	0	TW	US	381.31	N	OW
91094	HPR	U	L	0	0	US	US	0.00	C	BZ
91095	AG T	U	X	0	0	US		43.23	N	CY
91096	RFS	U	X	0	0	US	US	8.10	N	BZ
91097	T	E	X	0	0	US		6.48	N	TO
91098	AG	X	X	0	0	US	BZ	180.23	N	TO
91099	HPX	S	X	0	92007		US	0.01	C	BZ
91100	X	U	X	0	0	US	US	0.04	C	BZ
91101	HCP	U	P	0	0	US		0.00	C	BZ
91102	MULTI	U	P	85025	0	US	BZ	52.65	C	BZ
91103	HPX	X	X	0	0	US	US	0.13	C	BZ
92001	HPH	U	X	0	0	US	US	0.01	C	BZ
92002	HPH	E	X	0	0	US	US	0.11	C	BZ
92003	CON	U	X	0	0	US	US	20250.00	N	OW
92004	HPX	U	X	0	0	US	US	0.05	C	BZ
92005	AG	U	P	91080	0	UK	BZ	17.21	N	TO
92006	HPH	U	P	90088	0	CA	US	0.01	C	BZ
92007	HPX	U	P	91099	0		US	0.01	C	BZ
92008	HPX	U	X	0	0	US	US	0.01	C	BZ
92009	HPX	U	X	0	0	US	US	0.07	C	BZ
92010	AG	X	X	0	0	TW		20.18	N	BZ
92011	AG	U	P	90091	0	US		134.87	N	BZ
92012	AG	X	P	90095	0	US	BZ	153.50	N	CY
92013	X	X	X	0	0	US		153.50		
92014	RFS	S	X	0	93044	US	US	21.69	N	BZ
92015	I	X	X	0	0		BZ	0.00	N	TO
92016	C	X	X	0	0	US		0.77	N	OW
92017	HPX	U	X	0	0	US	US	0.01	C	BZ
92018	AG	U	X	0	0	US		303.35	N	CY
92019	HPX	U	X	0	0	US	TW	2.03	N	BZ
92020	HPX	U	X	0	0	US	US	5.12	C	BZ
92021	HPX	X	X	0	0	US	US	0.06	C	BZ
92022	HPH	X	X	0	0	PA	US	0.00	C	BZ
92023	X	X	X	0	0	US	US	40.50	M	SC
92024	HPH	X	X	0	0	US	US	0.00	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
92025	AG	H	S	0	0	US	US	0.00	N	CY
92026	HPR	E	P	0	0	TC	US	0.01	C	BZ
92027	HPH	U	X	0	0	US	US	0.01	C	BZ
92028	HPH	U	X	0	0	US	US	0.01	C	BZ
92029	HPH	U	X	0	0	US	US	0.01	C	BZ
92030	HPH	U	X	0	0	US	US	0.01	C	BZ
92031	HXX	X	X	0	0	US	SW	0.07	C	BZ
92032	HPH	U	N	0	0	US	BZ	0.19	C	BZ
92033	HPH	U	L	0	0	US	US	0.01	C	BZ
92034	C	X	X	0	92034	US		0.30	C	BZ
92035	TR	U	X	0	0	DU	US	0.21	M	BZ
92036	HPX	U	X	0	0	US	US	0.01	C	BZ
92037	RFS	X	N	0	0	US	BZ	6.84	M	CZ
92038	HPH	U	X	0	0	US	US	0.01	C	BZ
92039	HPH	X	X	0	0	US	BZ	0.06	M	SC
92040	HPH	U	N	0	0	US	BZ	0.06	M	SC
92041	AG	X	X	0	0	US		31.63	N	BZ
92042	RFS	U	X	0	0		US	8.10	N	CY
92043	AG	X	X	0	0	US	BZ	13.08	N	SC
92044	RFS	U	X	0	0	US	US	8.10	N	BZ
92045	C	X	X	0	0	HO	HO	0.00	M	BZ
92046	HPH	U	X	0	0	US	BZ	0.06	M	SC
92047	AG	U	P	88050	0	CA	BZ	142.69	N	CY
92048	X	U	X	0	0	US		0.00	C	BZ
92049	HPX	U	X	0	0	US	US	0.01	C	BZ
92050	REL	U	X	0	0	US	BZ	0.32	N	CZ
92051	X	E	X	0	0		BZ	6.08	N	TO
92052	HPX	U	X	0	0	US	BZ	0.06	M	SC
92053	HPH	X	X	0	0	US	BZ	0.07	M	SC
92054	HPX	X	X	0	0	US	US	0.06	C	BZ
92055	HPR	X	X	0	0	US	US	2.15	C	BZ
92056	RFS	S	X	0	93045	US	US	40.49	N	OW
92057	T AG F	X	X	0	0	US	US	613.58	M	SC
92058	X	U	X	0	0	TW	UK	10.76	N	CY
92059	X	X	X	0	0			1797.80	X	BZ
92060	HPR	X	X	0	0	US	BZ	1.34	M	SC
92061	HPX	U	L	0	0	GY		0.07	C	BZ
92062	HPX	U	X	0	0	US	BZ	1.83	C	BZ
92063	A	U	X	0	0	US	BZ	688.50	M	BZ
92064	AG	U	X	0	0		BZ	7.00	N	CZ
92065	HPX	U	X	0	0	US		0.00	C	BZ
92066	HPH	U	X	0	0	US		0.05	C	BZ
92067	RFS	U	X	0	0	US	BZ	12.15	N	CY
92068	AG	U	N	0	0	US	BZ	6.23	N	TO
92069	HPR HPH	X	X	0	0	US	BZ	0.09	C	BZ
92070	RFS	E	X	0	0		US	21.69	N	CY
92071	HPH	U	X	0	0	US	US	0.09	C	BZ
92072	HPH	X	X	0	0	US	US	0.00	C	BZ
92073	HPH	U	X	0	0	US	US	0.01	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
92074	HPH	U	X	0	0	US	US	1.65	C	BZ
92075	AG	X	X	0	0	US	BZ	40.50	N	CY
92076	HPR	U	L	0	0	US	US	0.00	C	BZ
92077	T	X	X	0	0	GA	BZ	6.79	N	CY
92078	T AG	U	N	0	0	US	US	972.00	N	TO
92079	AG	X	X	0	0	US	BZ	32.40	N	CY
92080	RFS	U	X	0	0	US	US	10.98	N	OW
92081	AG	U	X	0	0	TW	US	40.52	N	OW
92082	AG	U	X	0	0	TW	US	39.84	N	OW
92083	A	Z	S	0	0	US	US	688.50	M	BZ
92084	AG	U	X	0	0	SW	BZ	20.99	N	CY
92085	HPR	U	P	0	0	TC	US	0.01	C	BZ
92086	HPR	U	X	0	0	US	US	0.00	C	BZ
92087	HXX	X	X	0	0	US	US	0.00	C	BZ
92088		C		0	0			52.26		
92089	HPR	U	X	0	0	US	US	0.00	C	BZ
92090	HCP	X	X	0	0	TW	BZ	8.51	M	CZ
92091	HPH	U	X	0	0	US	US	1.46	C	BZ
92092	X	U	X	0	0	US	US	8.51	C	BZ
92093	HPX	U	X	0	0	US	US	0.00	C	BZ
92094	HPX	U	X	0	0		BZ	0.56	C	BZ
92095	HPX	X	X	0	0	US		0.15	C	BZ
92096	AG	X	X	0	0	US	BZ	48.30	N	CY
92097	T	E	X	0	0	US	US	3.90	C	BZ
92098	HPX	U	X	0	0	TW	BZ	0.81	M	BZ
92099	HPX	X	X	0	0	US	US	0.07	C	BZ
92100	HPX	X	X	0	0	US	US	0.06	C	BZ
92101	T	X	X	0	0	US	US	0.00	C	BZ
92102	HPX	U	X	0	0	US	US	0.04	C	BZ
92103	HPX	U	X	0	0	US	US	0.04	C	BZ
92104	T	U	F	0	0	US	US	299.70	M	TO
92105	X	X	X	0	0		BZ	81.00	N	CY
92106	HPX T	H	S	0	0	UK	UK	0.00	M	BZ
92107	X	X	X	0	0			20.25	N	CY
92108	X	X	X	0	0			20.25	N	CY
92109	X	X	X	0	0			10.13	N	CY
92110	X	X	X	0	0			10.13	N	CY
92111	X	X	X	0	0			12.15	N	BZ
92112	HPX	S	X	0	0	US	US	0.10	C	BZ
92113	AG	X	X	0	0	US	US	35.24	N	OW
92114	AG	E	F	0	0	ES	BZ	4.46	N	CY
92115	HCP T	E	L	0	0		US	34.22	C	BZ
92116	HPH	U	X	0	0	US	US	0.00	C	BZ
92117	I	U	X	0	0	TW	BZ	1.15	M	BZ
92118	AG	U	X	0	0	US	US	30.00	N	CY
92119	AG	U	X	0	0	US	BZ	17.62	N	CY
92120	HPX	U	X	0	0	US		0.04	C	BZ
92121	AG	U	X	0	0	US	BZ	33.88	N	CY
92122	HCX AG	U	N	0	0	TW	BZ	25.41	N	CZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
92123	CON	S	L	0	0	SW	UK	8100.00	M	CZ
92124	HXX	X	N	0	0	US	BZ	0.28	C	BZ
92125	X	X	X	0	0		BZ	0.15	C	BZ
92126	HPX	S	X	0	93003	CA		0.03	C	BZ
92127	AG	U	X	0	0	CA	BZ	12.61	N	CY
92128	AG	X	X	0	0	TW	BZ	341.35	N	OW
92129	AG	X	X	0	0	US		40.87	N	SC
92130	AG	X	X	0	0	US	BZ	9.32	N	SC
93001	HCP	X	X	0	0	TW	BZ	0.00	N	OW
93002	HCP	U	X	0	0	US	US	0.05	C	BZ
93003	M	U	P	92126	0	CA		0.03	C	BZ
93004	X	E	X	0	0	JA		9.64	N	CZ
93005	HPX	X	X	0	0	US	BZ	4.17	C	BZ
93006	X	X	X	0	0	US	BZ	8.10	C	BZ
93007	HPX	U	X	0	0	US	BZ	0.00	M	SC
93008	HPH	U	L	0	0	US	US	1.30	C	BZ
93009	HPX	X	X	0	0	US	US	2.71	C	BZ
93010	HPX T	U	P	91082	0	PA	BZ	29.91	C	BZ
93011	HPX T	X	F	0	0	US	US	12.15	M	TO
93012	AG A	X	X	0	0	US	BZ	17.35	N	BZ
93013	AG	X	X	0	0	TW	US	39.84	N	OW
93014	AG EDU	X	X	0	0	US	BZ	20.16	N	CY
93015	HPR	X	X	0	0	US	US	0.00	C	BZ
93016	AG	X	X	0	0	SW	BZ	3568.86	N	SC
93017	T	H	S	0	0	US	US	0.00	C	BZ
93018	AG	X	X	0	0	US		9.84	N	BZ
93019	RFS	U	X	0	0	US	BZ	20.25	N	TO
93020	HPX	X	X	0	0	US	US	0.04	C	BZ
93021	HPH	U	X	0	0	US	US	0.14	C	BZ
93022	HCP T M	Z	S	0	0	UK		162.00	M	CZ
93023	AG	U	X	0	0	US	BZ	8.80	N	CY
93024	AG	U	X	0	0	US	BZ	20.25	N	CY
93025	T	U	X	0	0	US	US	0.97	C	BZ
93026	HPH	U	X	0	0	CA	US	0.11	C	BZ
93027	HPH	E	L	0	0	US		0.05	C	BZ
93028	HPH	X	X	0	0	US	BZ	0.19	C	BZ
93029	HCP	U	X	0	0	US	US	0.00	C	BZ
93030	T	U	X	0	0	US	US	33.62	C	BZ
93031	HPH	X	X	0	0	US	US	0.00	C	BZ
93032	HPX	U	F	0	0	US	US	0.00	C	BZ
93033	C	U	X	0	0	US	US	0.29	M	BZ
93034	HPH	E	X	0	0		US	0.09	C	BZ
93035	AG	X	X	0	0	US	BZ	56.85	N	SC
93036	CON	S	L	92123	93097	SW	UK	8100.00	M	CZ
93037	T	X	X	0	0	US	BZ	51.84	M	SC
93038	RFS	U	X	0	0	US		19.37	N	CY
93039	HPH	S	X	0	93059	US	US	0.08	C	BZ
93040	HPH	S	X	0	93046	US	US	0.00	C	BZ
93041	T	X	X	0	0	TW	BZ	34.71	N	OW

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
93042	HPR	U	X	0	0	US	BZ	0.04	C	BZ
93043	RFS	U	X	0	0	US	US	21.91	N	BZ
93044	RFS	U	L	92014	0	US	US	21.69	N	BZ
93045	RFS	U	P	92056	0	US	US	40.49	N	OW
93046	HPH	U	P	93040	0	US	US	0.08	C	BZ
93047	RFS	N	X	0	0	TW	US	36.42	N	OW
93048	RFS	U	X	0	0	US	US	41.26	N	OW
93049	HPX	U	X	0	0	TW	BZ	0.53	M	BZ
93050	AG	X	F	0	0	US	US	109.94	M	SC
93051	HPH	U	L	0	0	CA	US	0.04	C	BZ
93052	HCP	U	X	0	0	TW	IN	1.01	M	BZ
93053	HPH	U	X	0	0	US	US	0.01	C	BZ
93054	AG	X	X	0	0	US	BZ	8.27	X	CZ
93055	RFS	U	X	0	0	TW	US	8.10	N	BZ
93056	CON	X	X	0	0	SW	US	601.83	M	CZ
93057	HPX	S	X	0	93141	US		0.05	C	BZ
93058	HPX CON	U	X	0	0	US	US	1.35	C	BZ
93059	HPH	U	P	0	0	US	US	0.08	C	BZ
93060	HPH	X	X	0	0	US	BZ	0.00	M	SC
93061	HPX	U	X	0	0	US	US	0.04	C	BZ
93062	T M	U	X	0	0	US	US	8.10	M	TO
93063	HPH	S	X	0	93124	US	US	0.15	C	BZ
93064	RFS	X	X	0	0	DU		8.57	N	CY
93065	RFS	U	X	0	0		BZ	6.08	N	TO
93066	HPX	U	X	0	0	US	US	0.09	C	BZ
93067	AG	U	X	0	0	DA		627.75	N	TO
93068	HPX	X	X	0	0	US		0.00	C	BZ
93069	HPH	U	X	0	0	US	BZ	0.15	C	BZ
93070	AG T	U	X	0	0	US		11.41	N	CY
93071	HPX	X	P	92112	0	US	US	0.10	C	BZ
93072	RFS	U	X	0	0	UK	US	8.10	N	CY
93073	AG	X	X	0	0	TW	BZ	10.91	N	CZ
93074	HCP	U	X	0	0	US	US	0.29	C	BZ
93075	HPR	U	X	0	0	CA	CA	0.00	C	BZ
93076	HPX	U	L	0	0	US	US	0.05	C	BZ
93077	HPX	U	L	0	0	US	US	0.05	C	BZ
93078	HPH	X	X	0	0	FR	BZ	0.00	M	SC
93079	HPH	U	L	0	0	US		0.05	C	BZ
93080	HPH	U	X	0	0	US	US	0.14	C	BZ
93081	RFS	X	L	0	0	TW	US	31.52	N	OW
93082	AG T	U	X	0	0	US	BZ	51.44	N	TO
93083	X	X	F	0	0	US	US	0.00	C	BZ
93084	HPX	S	N	0	94046	US	BZ	0.47	C	BZ
93085	AG	U	X	0	0	TW	BZ	283.50	N	OW
93086	EDU	X	X	0	0			2.03	C	BZ
93087	HPX	X	X	0	0	SA	US	0.05	C	BZ
93088	RFS	X	X	0	0	TW	BZ	6.46	N	CZ
93089	HCP	U	X	0	0	US	BZ	0.00	C	BZ
93090	HPX	X	X	0	0	US	US	0.01	C	BZ

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
93091	RFS	X	X	0	0	TW	US	2.26	N	CY
93092	T	U	X	0	0		US	0.04	C	BZ
93093	HPX	U	X	0	0		BZ	0.33	C	BZ
93094	HPX	X	X	0	0	US	US	0.11	C	BZ
93095	X	X	X	0	0		US	27.14	C	BZ
93096	HPH	X	X	0	0	US	US	0.09	C	BZ
93097	CON	U	P	93036	0	SW	UK	8100.00	M	CZ
93098	AG	U	X	0	0	JA	BZ	189.65	N	CZ
93099	RFS	X	X	0	0	TW		4.72	N	BZ
93100	AG	X	X	0	0	US	US	476.28	N	OW
93101	HPH	U	L	0	0	US	US	0.61	C	BZ
93102	X	S	X	0	94064	US	US	2.04	C	BZ
93103	HPH	U	L	0	0	US	US	0.68	C	BZ
93104	HPH	U	X	0	0	CA	BZ	0.07	C	BZ
93105	HPX	S	L	0	93115	TW	TW	1.15	M	BZ
93106	X	X	X	0	0	US	US	0.05	C	BZ
93107	HPX	X	X	0	0	US	US	0.06	C	BZ
93108	HPX	X	X	0	0	US	US	0.06	C	BZ
93109	HPR	X	L	0	0	US	US	0.05	C	BZ
93110	HPX	U	L	0	0		US	0.09	C	BZ
93111	HCP	X	X	0	0	US	LI	2.35	C	BZ
93112	EDU REL	R	X	0	0	US	CA	810.00	N	CY
93113		M		0	0			0.00		
93114	X	X	X	0	0	US	BZ	0.81	C	BZ
93115	HPX	U	L	0	0	TW	TW	1.15	M	BZ
93116	HCP	U	X	0	0		US	0.14	C	BZ
93117	HPX	U	X	0	0	US	US	0.00	M	SC
93118	X	X	P	91063	0	US	US	0.00	C	BZ
93119	X	X	X	0	0	PA		12.15		
93120	HPX	U	L	0	0	US	US	0.06	M	SC
93121	X	H	S	0	0			0.00	C	BZ
93122	T	Z	S	0	0	US	GY	0.04	C	BZ
93123	X	X	X	0	0		US	0.04	C	BZ
93124	X	E	X	93063	0	US	US	0.15	C	BZ
93125	HPH	X	X	0	0	US	US	2.21	C	BZ
93126	HPX	X	U	0	0	US	BZ	5.86	N	BZ
93127	T AG	X	X	0	0	US		20.25	N	CY
93128	AG	X	L	0	0	US	US	32.40	N	CY
93129	X	X	X	0	0		BZ	1.22	M	BZ
93130	HPR	X	L	0	0	US	CA	0.06	C	BZ
93131	X	X	X	0	0		BZ	0.37	C	BZ
93132	HPH	U	L	0	0	DU	HO	0.45	C	BZ
93133	HPH	U	X	0	0	US	BZ	0.00	M	BZ
93134	HPR	U	X	0	0	US	US	0.14	C	BZ
93135	RFS	E	X	0	0		BZ	10.35	N	CZ
93136	AG	U	X	0	0		BZ	10.62	N	OW
93137	X	X	X	0	0		BZ	5.27	C	BZ
93138	T	X	X	0	0	US	US	11.89	N	CY
93139	HPX	X	X	0	0	CA		0.05	M	SC

NO.	LAND USE	TYPE	AREA CODE	LAST	NEXT	BUYER	VENDOR	AREA (ha)	COAST	DIST.
93140	AG F	S	L	0	94002	TW	US	3198.29	N	BZ
93141	X	S	P	93057	94001	US		0.05	C	BZ
93142	X	X	X	0	0	US	US	0.00	C	BZ
93143	AG	X	X	0	0	US	US	810.00	X	SC
93144	AG	X	X	0	0	BA	BZ	34.63	N	CY
93145	AG	S	N	0	94059	US	BZ	4.36	X	TO
93146	HPX	X	X	0	0	US	US	0.13	C	BZ
93147	X	X	X	0	0	US		1.22	C	SC
93148	HPH	X	X	0	0	US	US	0.12	C	BZ

Explanatory Notes

No. **Aliens Licence Number. 93045 = licence 45 awarded in 1993**

Land Use Codes **This gives the type of development for which the land is being bought.**

A	Aquaculture
AG	Agriculture
C	Commerce
CON	Conservation
EDU	Educational institution
F	Forestry
HCH	Housing (commercial holiday homes)
HCP	Housing (commercial residential homes)
HPH	Housing (private holiday home)
HPR	Housing (private residential home)
HPX	Housing (private. Not stated whether for residence or holiday home)
HXX	Housing (Not stated whether commercial or private).
I	Industrial
M	Marina
P	Port
REL	Religious institution
RFS	Rural farmstead
T	Tourism
TR	Transport
X	Not stated

Type **The outcome of the licence**

U	The licence was used
S	The licence was superseded by a replacement. This happens because the licence expires after 30 days, so if the transaction gets delayed, a new licence is often required.
E	The licence expired and was not replaced.
C	The licence was canceled.
M	The licence was issued in error.
R	The licence was refused.
N	The licence was not used.
X	Not known of the licence was used. Real estate dealers and LSD staff estimate about 95% of licences are used.
H	The licence was for shares, i.e. for a foreigner buying shares in a company that holds land. H signifies that it is unknown if the license was used.
Y	As for H but the licence was not used.
Z	As for H but the licence was used.
O	The licence was issued to a bank in relation to arranging a mortgage.

Area code **Whether the land is being bought by an alien for the first time**

L	Land previously bought by an alien.
P	Land that a superseded aliens land holding licence had been issue for.
N	Land not bought by an alien before, at least since the introduction of the Act in 1974.
X	Not known if land was purchased from an alien.
S	Licence is for shares in company, rather than directly for land.
F	Licence transfering land between family members

Last **The superseded licence number for which this is a replacement**

Next **The licence number that replaces this superseded one**

Buyer **The nationality of the buyer** **Vendor** **The nationality of the vendor**

BA	Bahamas
BZ	Belize
CA	Canada
DA	Denmark
DU	Netherlands
ES	El Salvador
FR	France
GA	Guyana
GY	Germany
HO	Honduras
IN	India
JA	Jamaica
LI	Lichtenstein
PA	Panama
SA	South Africa
SW	Switzerland
TC	Turks and Caicos
TW	Taiwan
US	United States
UK	United Kindom

Area **The size of the parcel being purchased**

Coast **Where the parcel is located**

N	Inland
M	On the mainland coast
C	On the cayes
X	Unknown

Dist. **Which district the parcel is in**

BZ	Belize District
CY	Cayo District
CZ	Corozal District
OW	Orange Walk District
SC	Stann Creek District
TO	Toledo District